ENGINEERING AND MINING JOURNAL

A McGRAW-HILL PUBLICATION

AUGUST 1950

FOUNDED 1866

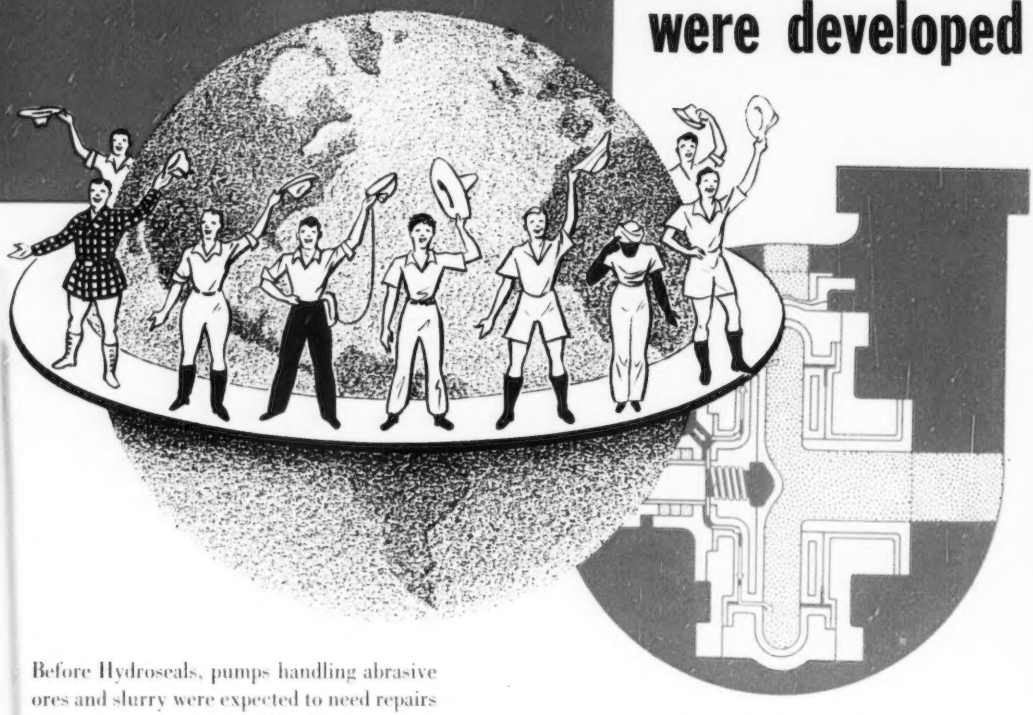
U. S. STEEL PLANS BIG FOR VENEZUELAN * IRON DEVELOPMENT

MACK LAKE, WHO WILL DIRECT THE JOB TELLS FOR THE FIRST TIME IN DETAIL

- How Cerro Bolivar, the iron ore mountain, was found.
- How the ore occurs.
- How the ore will be mined. See page 72

Special— Don't miss the Mining Congress Show Section—p. 127

Milling Engineers had a tough time pumping ore until Hydroseals were developed



Before Hydroseals, pumps handling abrasive ores and slurry were expected to need repairs and new parts frequently. Because wear rapidly reduced their capacities, pumps were engineered oversize. So, initial costs as well as maintenance were high.

This picture was changed by the Hydroseal principle and the wear-resisting materials effected by Allen-Sherman-Hoff research. Today, tremendous tonnages of ores are pumped without shutdowns, and at savings in power. All over the world, milling engineers take their hats off to rugged Hydroseals for their efficiency and economy.

No matter what you are milling or where, our specialists can help you. Write now.

THE ALLEN-SHERMAN-HOFF CO.
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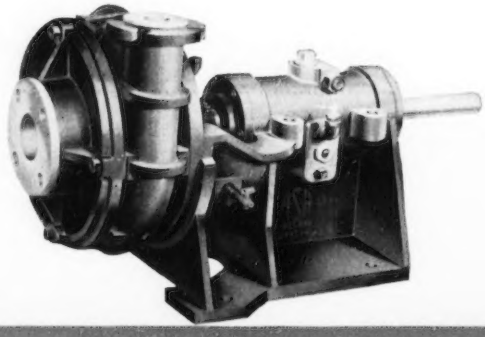


HYDROSEAL SAND, SLURRY & DREDGE PUMPS
MAXIMIX RUBBER PROTECTED

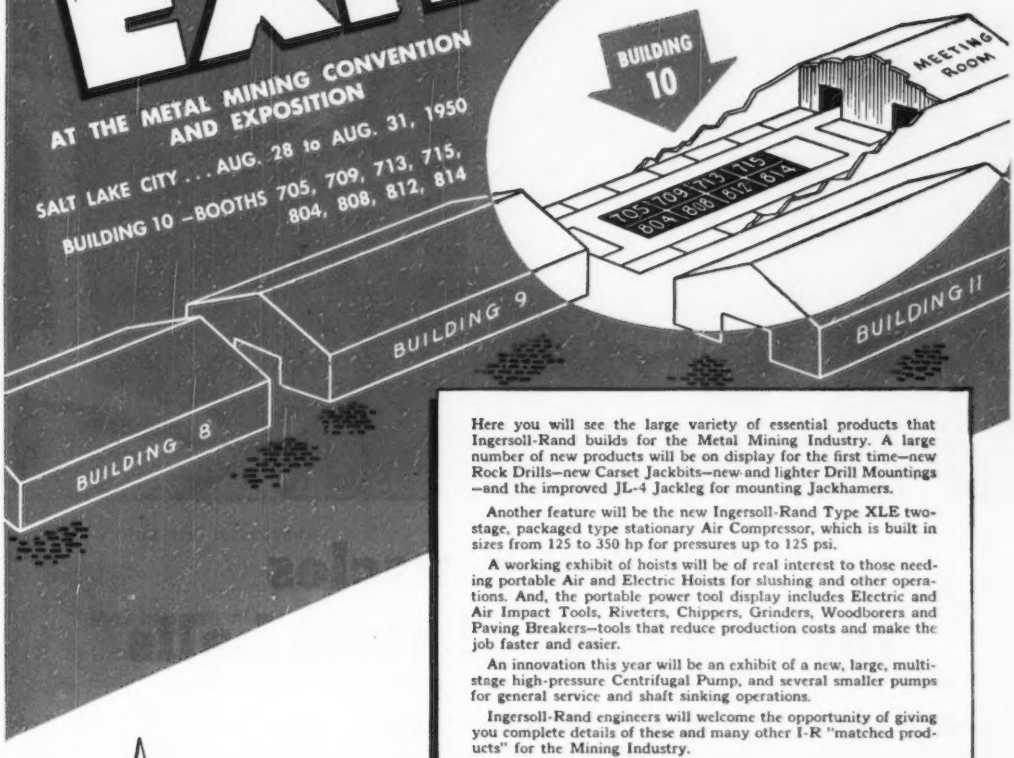
HYDROSEAL, PACKLESS AND MAXIMIX DESIGNS ARE COVERED BY PATENTS AND APPLICATIONS IN THE MAJOR MINING CENTERS OF THE WORLD

Visit Ingersoll-Rand EXHIBIT

AT THE METAL MINING CONVENTION AND EXPOSITION

SALT LAKE CITY . . . AUG. 28 to AUG. 31, 1950

BUILDING 10 —BOOTHS 705, 709, 713, 715, 804, 808, 812, 814



Here you will see the large variety of essential products that Ingersoll-Rand builds for the Metal Mining Industry. A large number of new products will be on display for the first time—new Rock Drills—new Carset Jackbits—new and lighter Drill Mountings—and the improved JL-4 Jackleg for mounting Jackhamers.

Another feature will be the new Ingersoll-Rand Type XLE two-stage, packaged type stationary Air Compressor, which is built in sizes from 125 to 350 hp for pressures up to 125 psi.

A working exhibit of hoists will be of real interest to those needing portable Air and Electric Hoists for slushing and other operations. And, the portable power tool display includes Electric and Air Impact Tools, Riveters, Chippers, Grinders, Woodborers and Paving Breakers—tools that reduce production costs and make the job faster and easier.

An innovation this year will be an exhibit of a new, large, multi-stage high-pressure Centrifugal Pump, and several smaller pumps for general service and shaft sinking operations.

Ingersoll-Rand engineers will welcome the opportunity of giving you complete details of these and many other I-R "matched products" for the Mining Industry.

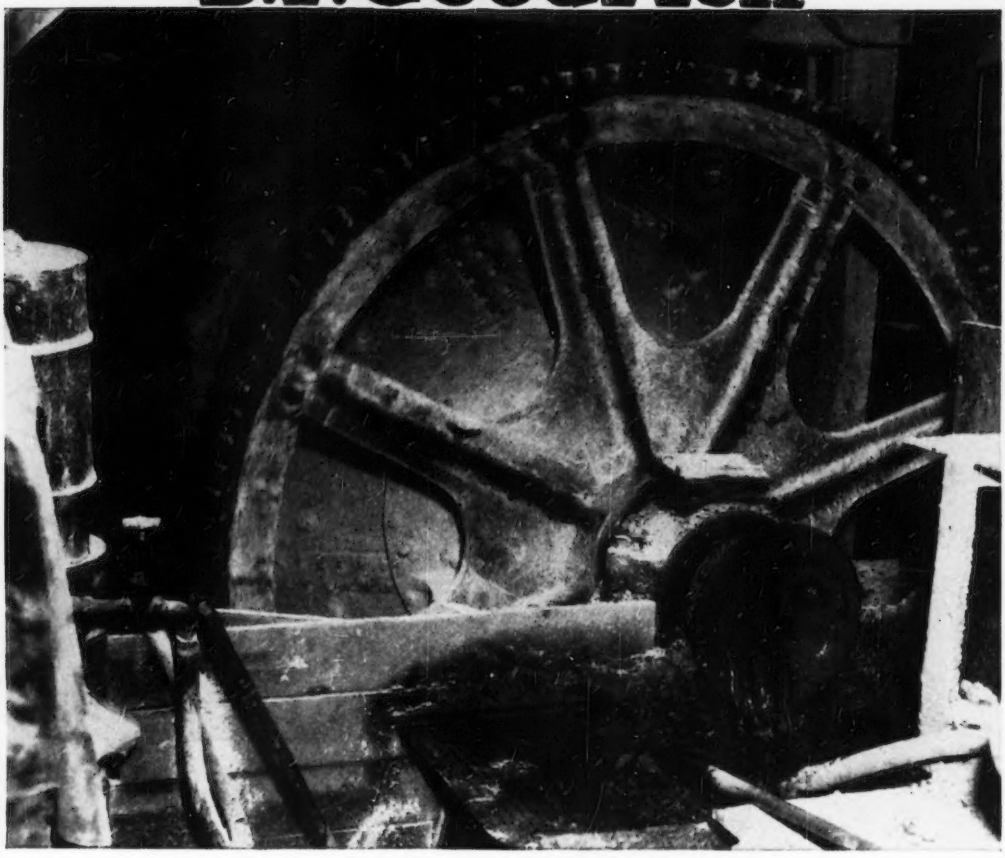
PRODUCTS DISPLAYED — MOST OF THEM NEW —

Jackhamers . . . Stopehamers . . . Drifters . . . Wagon Drills . . . Drill Mountings . . . Carset Jackbits . . . Air Compressors . . . Diesel Engines . . . Mine and Slusher Hoists . . . Air and Electric Tools . . . Centrifugal Pumps

549-14

11 BROADWAY, **Ingersoll-Rand** NEW YORK 4, N. Y.

B.F.Goodrich



Rubber muscles toss 20 tons of steel balls

A typical example of B. F. Goodrich improvement in rubber

INSIDE that big iron drum are 20 tons of 4-inch steel balls. They're grinding up rock, mud and ore in order to separate a fine white powder for paints. As the drum turns, the balls fall and roll over the rock.

But there was constant trouble and expense with the big V belts driving the mill. There was space enough for only six belts; they needed more; they were lasting only five or six weeks. Then the engineers heard of B. F. Goodrich grommet belts.

A grommet is like a giant cable except that it's endless—it's a cord loop built by winding heavy cord on itself. It stands hard pulls and jerks, yet is flexible. The first grommet belts lasted not six weeks but six months, saved $100 a month in belt costs, saved a probable $800 for redesigning and rebuilding the drive.

Product improvement like this goes on constantly at B. F. Goodrich—in V belts, conveyor belts, hose—no BFG product is ever regarded as "finished" or standardized or too unimportant to get its share. If you use V belts or other industrial rubber goods, don't decide any product you may buy is the best to be had without first seeing your BFG distributor and finding out what B. F. Goodrich research may have done recently to improve it. If your business uses V belts, ask the BFG distributor to show you the V belt "X-ray" demonstrator, or write: *The B. F. Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

B.F.Goodrich
FIRST IN RUBBER

ENGINEERING AND MINING JOURNAL

84th YEAR OF PUBLICATION

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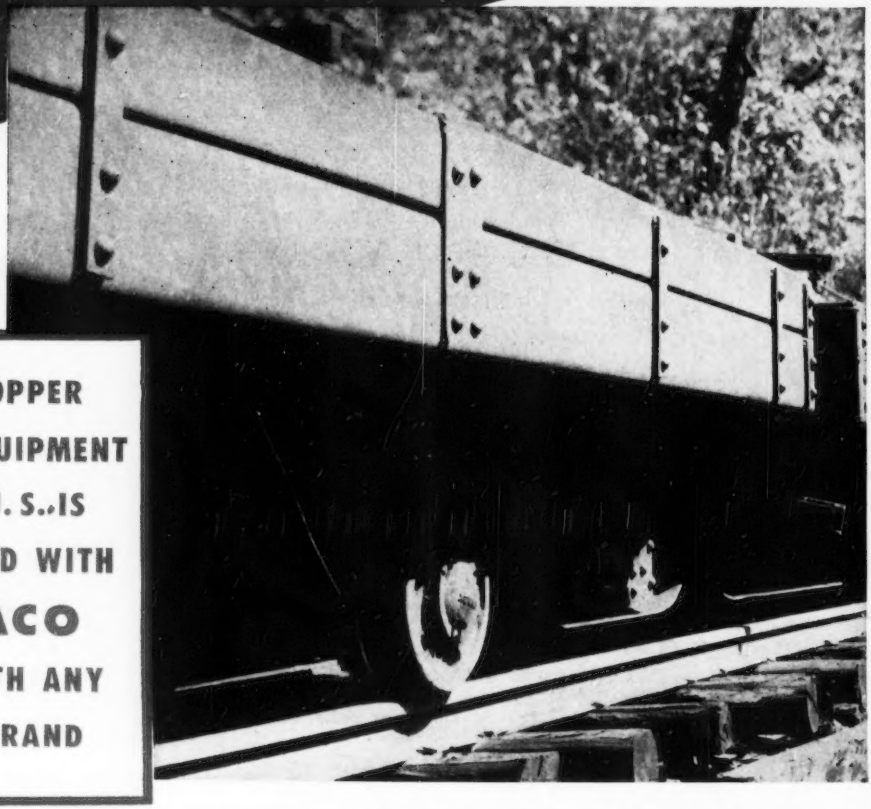
START YOUR TRAINS
STOP HIGH



MORE COPPER
MINING EQUIPMENT
IN THE U. S. IS
LUBRICATED WITH
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THAN WITH ANY
OTHER BRAND

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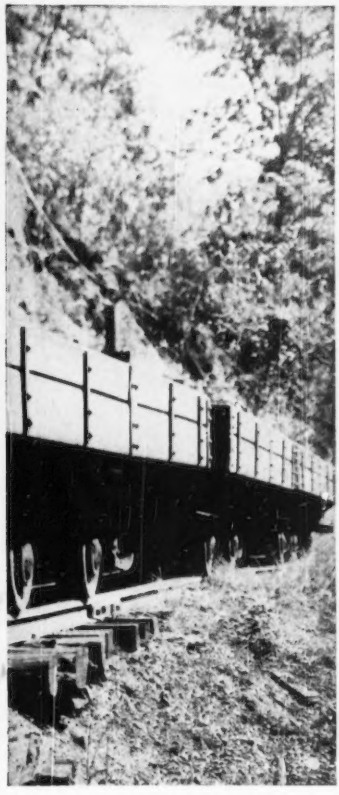
EASIER MAINTENANCE COSTS



Lubricate mine car wheels with TEXACO OLYMPIAN GREASE

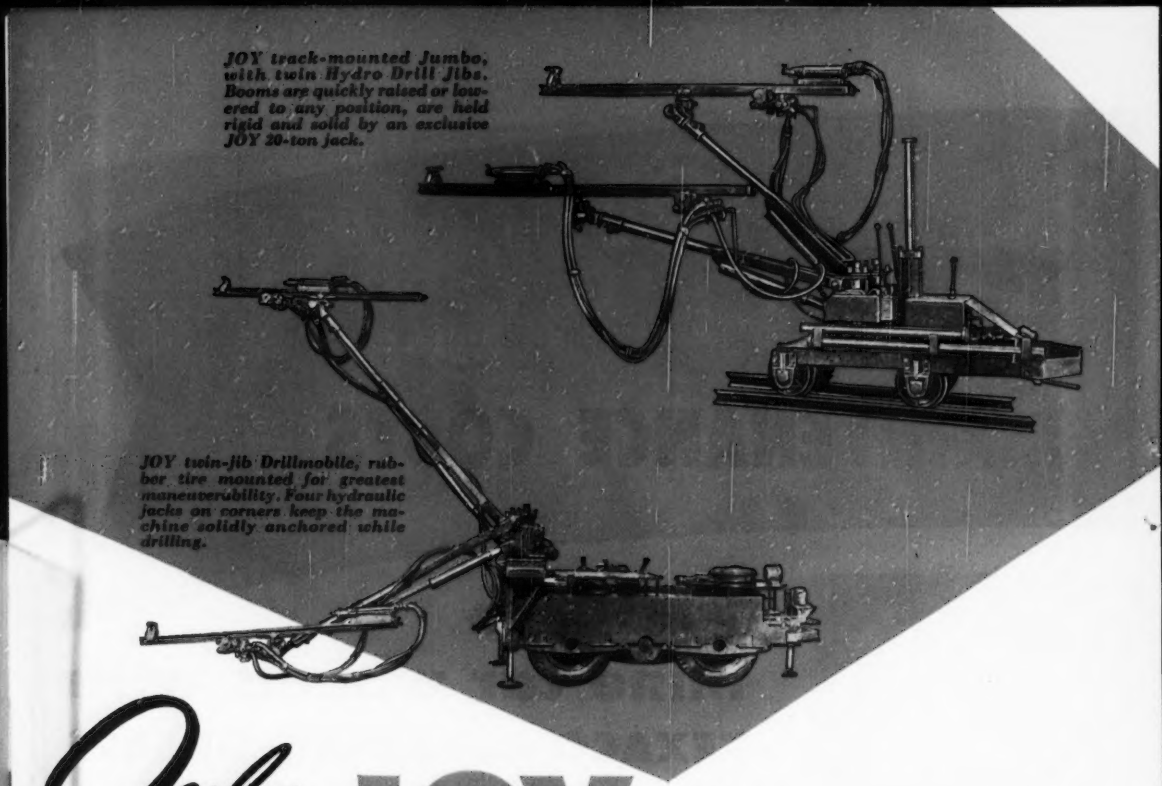
FOR a lubricant that's a real "helping hand" in getting your trains started easily – winter as well as summer – use *Texaco Olympian Grease*. It's ideal in all seasons for all types of car wheel bearings – plain, cavity hub or anti-friction. It *stays in* the bearings . . . both starting and running torque are always low.

Texaco Olympian Grease has exceptionally high oxidation resistance and does not separate in use or in storage. It seals out dirt and moisture and maintains its protective lubrication far longer than ordinary greases. Thus, bearings last longer, maintenance costs come down. *Texaco Olympian Grease* is made in three consistencies to meet every mine car requirement.

To prolong the life of open gears, use *Texaco Crater X Fluids*. They go on as fluids, stay on as tough, adhesive films that reduce wear and noise. To keep wire rope strong longer, lubricate it with *Texaco Crater*.

Improve efficiency and reduce machinery maintenance costs throughout your mine. A Texaco Lubrication Engineer will gladly help you. Just call the nearest of the more than 2,000 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

Lubricants and Fuels
FOR THE MINING INDUSTRY



JOY track-mounted Jumbo, with twin Hydro Drill Jibs. Booms are quickly raised or lowered to any position, are held rigid and solid by an exclusive JOY 20-ton jack.

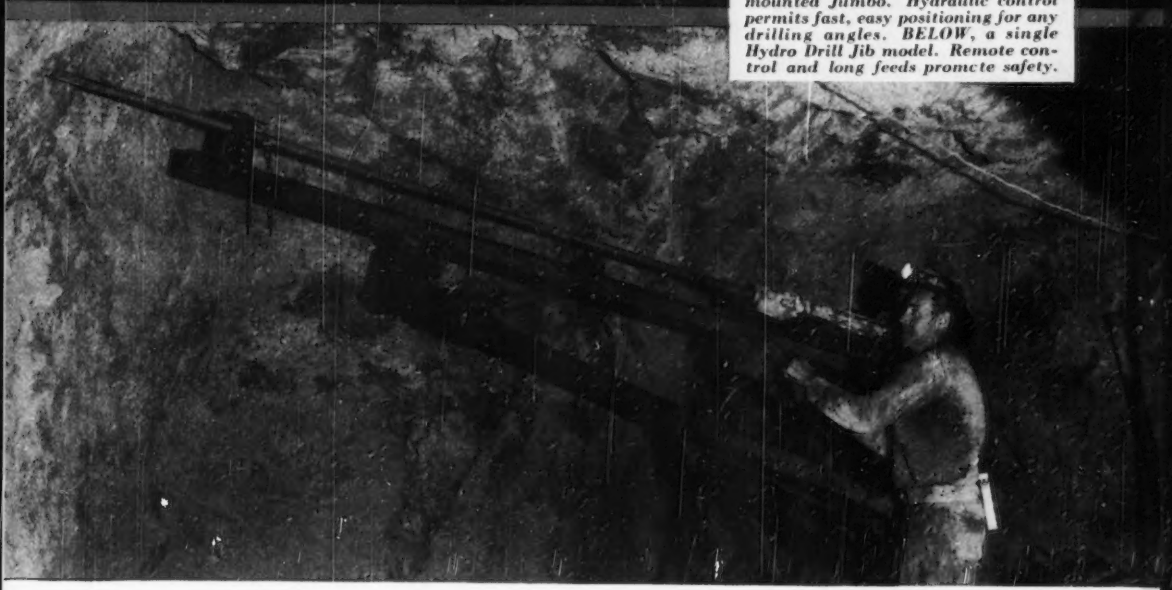
JOY twin-jib Drillmobile, rubber tire mounted for greatest maneuverability. Four hydraulic jacks on corners keep the machine solidly anchored while drilling.

Only JOY HYDRO DRILL JIBS

give you all these Advantages for FASTER ROUNDS at LESS COST

- ★ Long drill feeds—remote control of drills for easy one-man operation
- ★ Complete hydraulic control of jib positioning—pioneered by JOY
- ★ Drill holes more accurately spaced—correct angles more easily maintained
- ★ Greater speed in moving in—setting up—tearing down and moving out . . . no lost time
- ★ Drills holes anywhere in the face—no blind spots
- ★ Greater safety and no back-breaking labor for drill runners—they like it

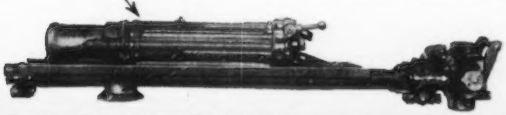
ABOVE, Twin Hydro Drill Jibs with two JOY T-300 Drifters on a track-mounted Jumbo. Hydraulic control permits fast, easy positioning for any drilling angles. BELOW, a single Hydro Drill Jib model. Remote control and long feeds promote safety.



FOR BEST ALL-AROUND PERFORMANCE WITH JOY HYDRO DRILL JIBS . . .

JOY SILVER-STREAK DRIFTERS

and **JOY SULMET BITS**



Write for Bulletins, or

Consult a Joy Engineer

M243

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"We Get More Rock Per Round And Per Pound With The New ROCKMASTER "16" Blasting System!"

FROM drift and tunnel comes the word: "ROCKMASTER "16" *gives as much as 30% more footage per round!*" And many mine foremen claim that they accomplish this with less powder. Naturally, this adds up to more carloads of material per round and per pound.

There's more to the ROCKMASTER "16" story! *Sixteen* periods—a wide choice of short or long milli-second delays—give better control over throw, back-break, and material size. *Sixteen* delay periods fire within 550 milli-seconds!—there is less strain on timbers and roof . . . less dust and a quicker return to the face.

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See us at the
METAL MINING
Convention &
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Salt Lake City
August 28-31

BOOTH 114

Our sales and technical personnel will be on hand to assist you with your blasting problems and explain how ROCKMASTER blasting can help you.

ROCKMASTER: Reg. U. S. Pat. Off.

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"Everything for Blasting"

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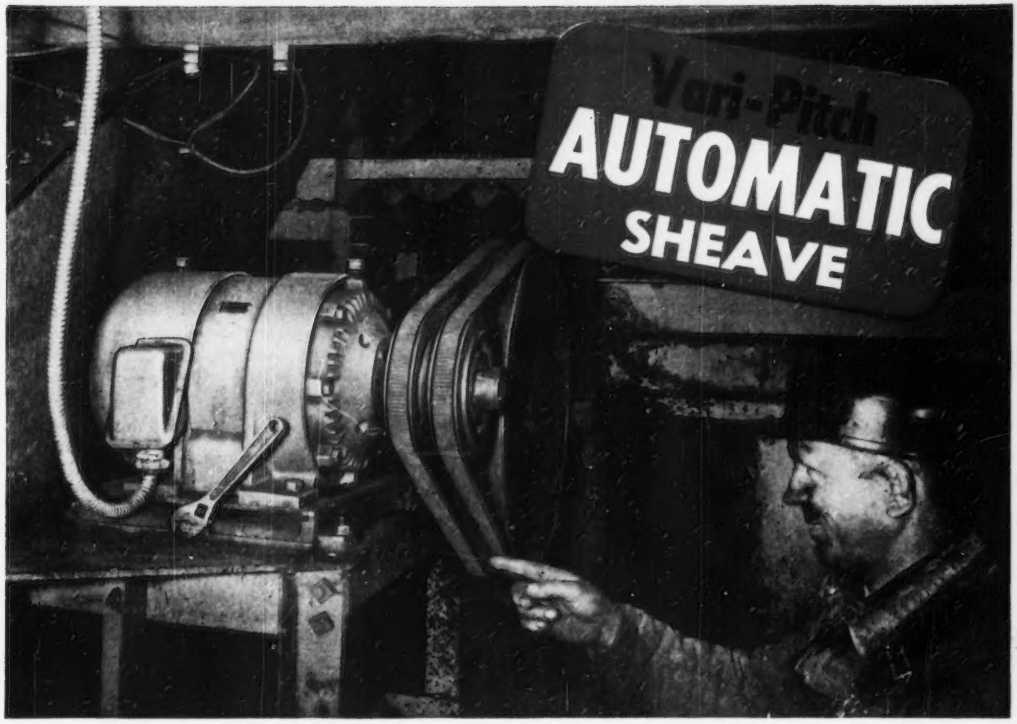
ATLAS POWDER COMPANY, Wilmington, Del. • *Offices in principal cities* • *Cable Address—Atpowco*



Best Buy in Variable Speed!

COMPARE THESE FEATURES of *Vari-Pitch* Automatic sheave with any other variable speed drive and see why *Vari-Pitch* Automatic drive gives you more for your drive dollar.

1. Changes speeds with one hand while machine is running.
2. All mechanism is inside one sheave actuated by movement of the motor base.
3. Ample capacity and safety factor of multiple belts.
4. Full range of sizes from 1 to 40 hp.
5. Top speed is 100% higher than low speed.
6. Quiet operation.
7. Cushioned start.
8. Simple design and easy installation make cost low.
9. Occupies no more space than ordinary sheave.

Vari-Pitch Automatic drive will pay for itself very quickly in increased production, improved quality and more flexible operation on many machines in your plant. Ask your Allis-Chalmers Authorized Dealer or Sales Office representative to give you savings and cost figures on your operations. Or write for bulletin 20B7223.

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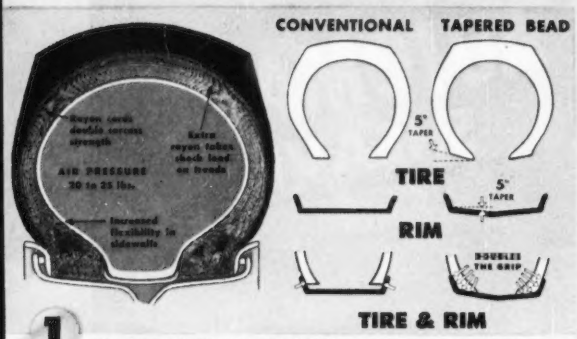
See a Hydrocone crusher in operation — the gyratory crusher now available in a new, wider range of sizes. See — an operating Ripl-Flo vibrating screen . . . a rubber lined pump . . . a solids handling pump with automatic Texrope drive . . . new motors . . . motor starters . . . a new air break contactor!

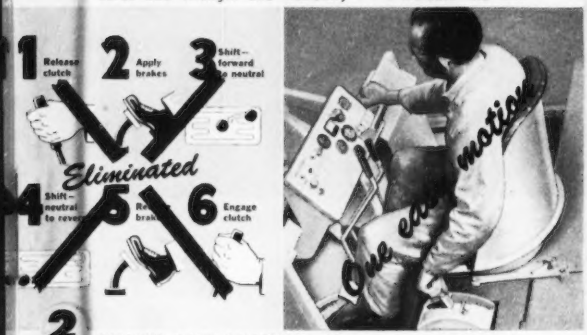
American Mining Congress
Metal Mining Show
Salt Lake City
August 28-31

HERE'S WHY 19 m.p.h.

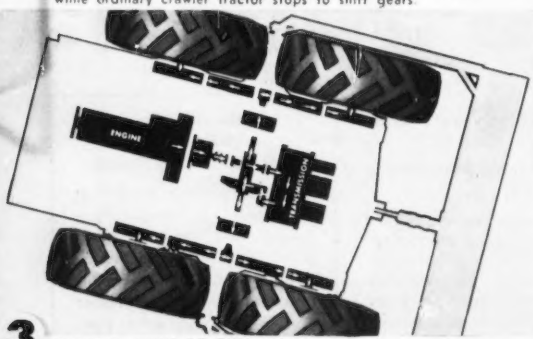


TIRE & RIM

1 **BIG TIRES INCREASE TRACTION**—Tournadozer's 21.00 x 25 low-pressure tires give you greater ground-gripping traction and increased flotation in sand, mud, snow or ice. Tapered bead doubles tire-to-rim grip, prevents tire slipping. Rayon cords add strength and flexibility . . . increase tire life.



2 **INSTANT GEAR SELECTION**—Change gear ratios instantly, automatically, with finger-tip air-valve lever. Constant power retains vital momentum . . . keeps dirt rolling . . . gets more work done. Tournadozer travels 100' in 3rd gear while ordinary crawler tractor stops to shift gears.



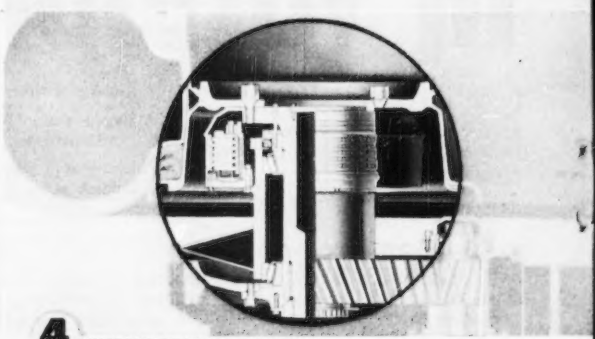
3 **180 H.P. PUSH OR PULL**—Hangs on and moves heavy loads even in toughest going. Low compression ratio diesel engine gives more power with less fuel. 4-wheel drive provides quick pickup on level or up steep grades. Rig rolls on rubber . . . has no tracks to grind in abrasive materials.

FIRST this job-proved dozer on rubber "runs" at 19 m.p.h., instead of crawling at 5 to 8 m.p.h. It maneuvers twice as fast—and dozes twice as fast as the average crawler. It gives you reverse speeds to 8 m.p.h. . . . cuts deadhead cycle time by 2.5 to 1. And, you get far more use from its greater speeds, because you have instantaneous speed selection and can change into higher gears without shifting or losing momentum.

SECOND Tournadozer has the high-speed mobility to put normal waiting periods to work. When needed on scattered odd jobs, operator just hops on this big dozer . . . and drives 19 m.p.h. cross-country or over highways. No blocking, no waiting for trailer, no loading or unloading delays. Giant 21.00 x 25 low-pressure tires prevent damage to pavement and other surfaces . . . and, in poor footing, give you plenty of traction to pull through mud, sand, or snow which would stall ordinary crawler dozers.

THIRD you can keep Tournadozer working and earning during the off-season by equipping it for subcontracts or rentals with any of 10 auxiliary tools — including Scraper, Angledozer, Logging Winch, Side Crane, or Snow Plow. With each unit, Tournadozer's 180 h.p. engine, 4-wheel drive, and rubber-tired mobility will pay off in more work done.

Let your LeTourneau distributor give you all the facts. Call him . . . or write for new Tournadozer Bulletin TD-117 TODAY!



4 **INSTANT BRAKING POWER**—Short-coupled 6' wheelbase and instantaneous shift give you a compact, fast-stepping unit. Heavy-duty 4-wheel air brakes, with 1305 sq. in. of braking surface on each wheel — 5220 sq. in. on all four — give you safe, sure, complete control at all times.

LET

Send now to: **R. G. LeTOURNEAU, Inc., Peoria, Illinois**

We may be in market for one or more Tournadozers. Please send information on ☐ 180 h.p. C Tournadozer or ☐ 122 h.p. D Tournadozer for use with:

NAME _____
TITLE _____
COMPANY _____
STREET _____ CITY, STATE _____
TYPE OF WORK _____

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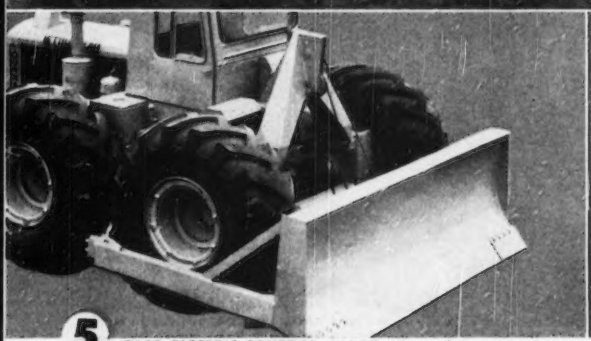
☐ Angledozer
☐ Carryall Scraper
☐ Logging Winch
☐ Tree Pusher
☐ Snow Plow
☐ Side Crane
☐ Rooters
☐ Rollers
☐ Root Rake

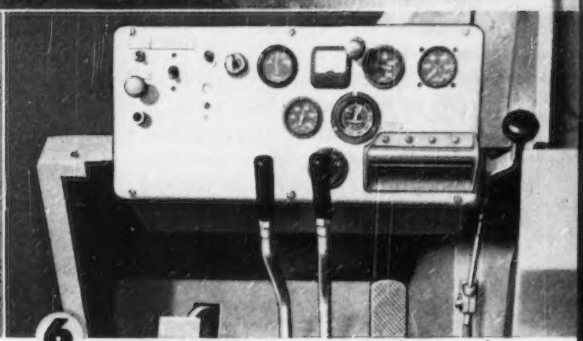
TOURNADOZER will do more work for you

HANDLES 7 MAINTENANCE JOBS IN 10 HOURS— At their Genoa open-pit iron mine near Eveleth, Minn., E. W. Coons Co. has assigned a number of widely scattered jobs to one C Tournadozer. In a typical 10-hr. shift, the hustling rubber-tired "C" maintains 2 overburden dumps, stockpiles lean ore, cleans up around 3 large stripping shovels, and handles haul road maintenance. Compared to ordinary crawler operation, Tournadozer's work-and-run ability makes every hour productive for profits.

Tournadozer—Trademark Reg. U.S. Pat. Off. C13



5 **FAST ELECTRIC-CONTROL BLADE**—Powerful, electric-control PCU plus smooth, accurate, short-coupled cable connection gives better blade control to match high dozing speed. 44" lift . . . unlimited drop . . . 5" tilt at either end. 11'2" x 3'7" bowl fills fast, drifts big 2½-yd. load.



6 **EASY TO OPERATE**—Compressed air takes the work out of Tournadozing. Simple controls are air-actuated . . . easy to reach. Operator sits up front ahead of engine . . . can see where he's going, what he's doing. No stretching, no twisting, no end-of-day fatigue slow-down.

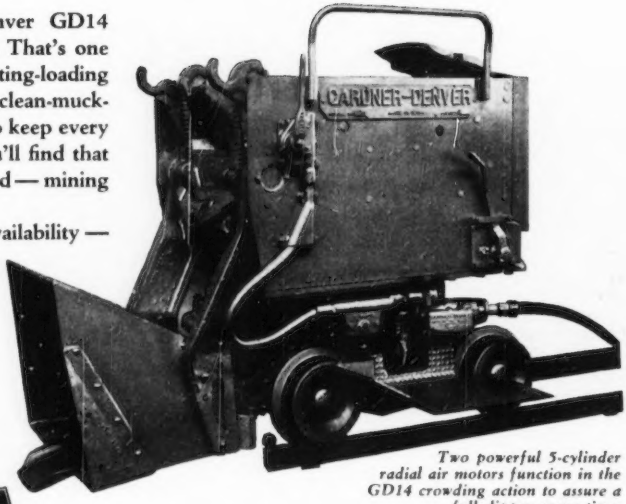
LETOURNEAU PEORIA, ILLINOIS — JOB-PROVED The World Over — **TOURNADOZERS**

IT'S RUBBER THAT PUTS THE ACTION IN TRACTION

Q. HOW CAN I GET A FASTER CYCLE IN EVERY HEADING?

A. Let Gardner-Denver GD14 Mine Car Loaders handle the mucking. That's one good way to speed up the drilling-blasting-loading cycle in every heading. With these fast, clean-mucking loaders, you can schedule the work to keep every loader busy throughout every shift. You'll find that productivity and efficiency are increased — mining costs are lowered.

GD14 Loaders give you full-time availability — as proved by their performance in hundreds of mining installations. Gardner-Denver *master engineering* features provide speed for the job and safety for the man. Get all the facts — send today for Bulletin MCL.



Two powerful 5-cylinder radial air motors function in the GD14 crowding action to assure a full dipper every time.

SINCE 1859

GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois
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Why the NORTHWEST is a BETTER MINING SHOVEL!

BETTER TRAVEL

The Northwest Steering is smoother — easier on operator and machine with *positive* traction on *both* crawlers while turning as well as when going straight ahead.

BETTER CONTROLS

The "Feather-Touch" Clutch Control gives easy operation. It is free from complications or sensitive mechanism. No special servicing is ever required and manual control can be had on the instant.

BETTER SWING CLUTCHES

Uniform Pressure Swing Clutches that grip easily, are free from jerks and grabs that make spotting the load difficult and waste digging time.

THE Northwest is a real Rock Shovel proved in hard rock work. Greater simplicity in design makes maintenance easier. Unusual mobility as compared with other crawler designs saves time clearing for shots. Fast swing and high capacity under many conditions improves output over larger equipment. The Helical Gear Drive gives smooth trouble-free transmission of power. Cast Steel Bases and Machinery Side Frames are ruggedly built and maintain shaft alignment and Ball and Roller Bearings on all high-speed shafts cut power losses to the minimum.

In the Northwest you have a combination of advantages not found in any other shovel size for size—advantages that mean greater output and lower cost operation.

BETTER CROWD

The Northwest Dual Independent Crowd utilizes force most other independent crowds waste assuring the handling of tough digging with greater output.

CUSHION CLUTCH

Reduces shock overloads of heavy digging *before* they can damage machinery.

NORTHWEST ENGINEERING COMPANY
1509 Field Building • 135 South LaSalle Street • Chicago 3, Illinois

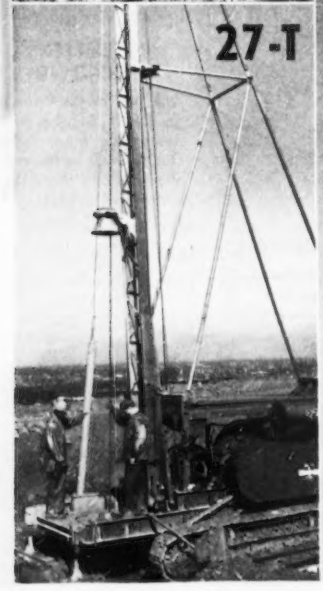
NORTHWEST

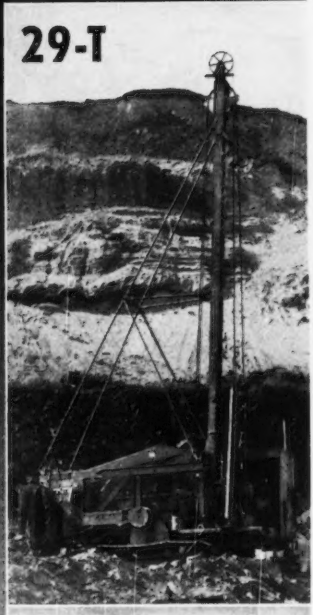
Convertible for any Mining Material Handling or Excavation Problem

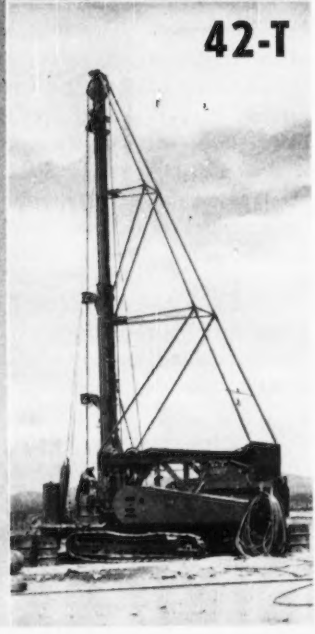
Visit Booths 611-613, A.M.C. METAL MINING SHOW, Salt Lake City, August 28-31

T- Formation for Extra Footage

22-T 6″ to 6⅝″ holes
27-T 6″ to 6⅝″ holes
29-T 6⅝″ to 9″ holes
42-T 9″ to 12″ holes







For increased footage per hour of drill operation on ore or rock preparation, it will pay you to investigate the complete line of Bucyrus-Erie "T" blast hole drills. These caterpillar-mounted machines combine a high-speed, hard-hitting drilling motion with appropriate tool weights to deliver extra footage every shift.

Key to the hard-hitting drilling motion of every Bucyrus-Erie blast hole drill is the shock absorber in the derrick head. This shock absorber consists of a series of rubber discs which compress as the tools travel downward, permitting them to "reach out" on every blow. The instant the bit strikes, the discs expand and snap the tools away from the hole bottom, giving each blow the sharpness that means most effective penetration. The result is steady high footage.

When planning new equipment purchases, consider what this extra footage will mean to you in lower production costs. Then, choose the Bucyrus-Erie blast hole drill best suited to your work. Write for complete information today! 30850

BUCYRUS ERIE

South Milwaukee, Wisconsin

"Caterpillar" team-play scores again

"Cat" D311 and D3400 Diesels power these Bucyrus-Erie churn drills in strip-mining operations near Ray, Arizona, for the Kennecott Copper Corporation of New York. They're as rugged as the mountains in the background.

"Cat" DW10 Tractor equipped with 'dozer cuts costs by high-speed shuttling between shovel area and dump for cleanup jobs and leveling.

To BLAST and strip 4,000,000 yds. of overburden to establish an open-pit copper mine near Ray, Arizona, the Isbell Construction Co. uses a mechanized division of "Caterpillar" equipment to break through. The heart of the operation is a platoon of tough, reliable "Cat" Diesel Engines which power auxiliary equipment with minimum down time. By standardizing with "Caterpillar," they get speedy, one-dealer service on engines and machines alike when an occasional minor repair is needed.

Included in Isbell's assault forces are 22 pieces of "Caterpillar" equipment. The D311 and D3400 Engines are powering Bucyrus-Erie churn drills blasting holes to 1500 ft. to determine the depth of copper and character of deposits. A D13000 and a D8800 are used for miscellaneous compressed air jobs. Shovels are "Caterpillar" Diesel powered. D3400 and D4400 Electric Sets generate electrical power. "Cat" D8 Tractors tend overburden dump and make road. A "Cat" DW10 utilizes its speed to shuttle between shovel area and overburden dump for cleaning and leveling. The "Cat" No. 12 Motor Grader, with its highly maneuverable blade, smooths the way for everything.

"Caterpillar" earthmoving units are power-rated and precision-built to work as a balanced team. They get the job done faster and better and their big-muscled reliability eliminates operational headaches. Equally important, the world-famous "Caterpillar" service is available any time, any place. "Caterpillar" dealers are the shock troops of the organization; they know their job *down to the ground.*

CATERPILLAR TRACTOR CO. • PEORIA, ILL.

Visit the "Caterpillar" exhibit at the Metal Show: Salt Lake City, August 28-31

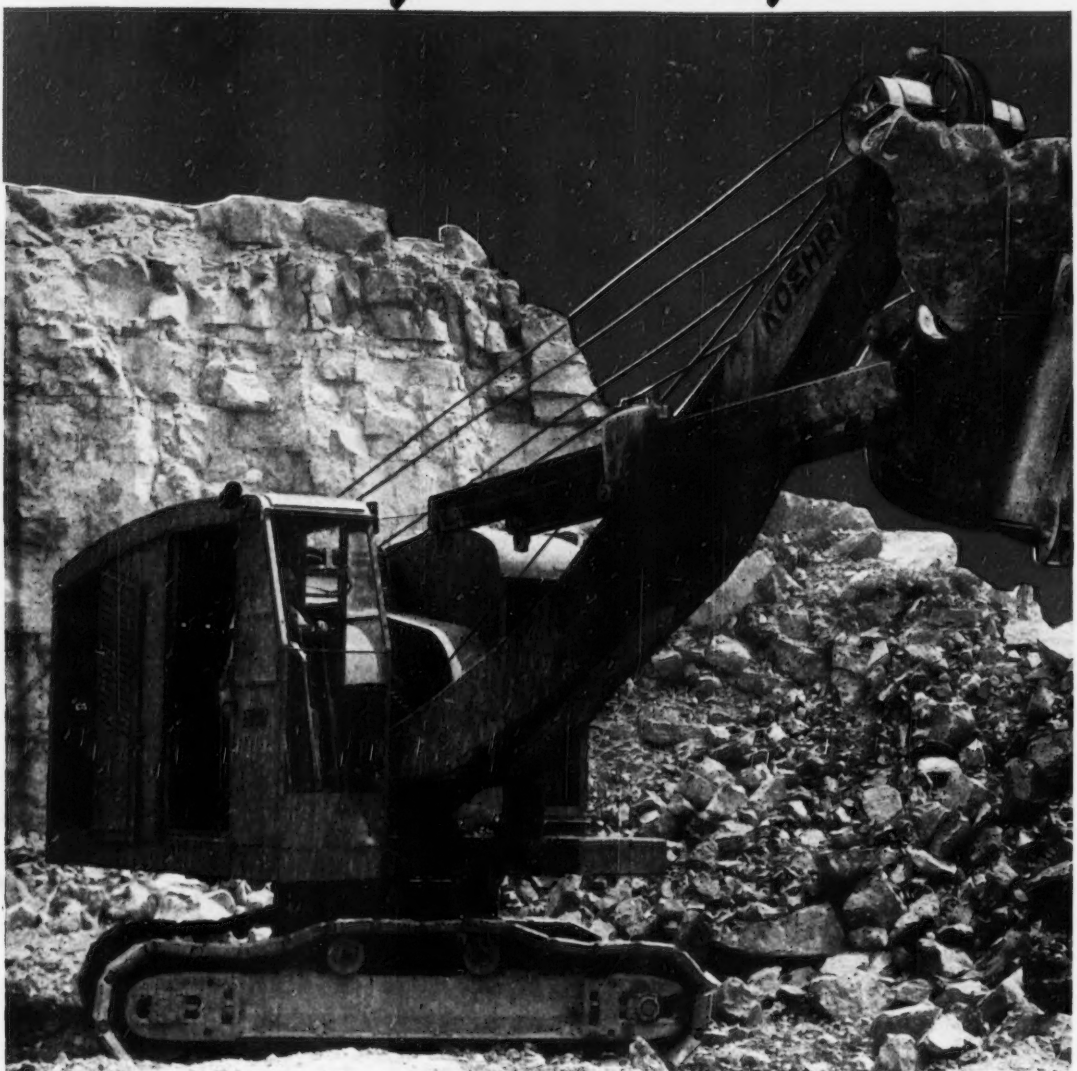
CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES • TRACTORS

MOTOR GRADERS • EARTHMOVING EQUIPMENT

When you compare



KOEHRING COMPANY
Milwaukee 16, Wis.

Subsidiaries: JOHNSON • KWIK-MIX • PARSONS

. . . measure by

"KOEHRING WORK CAPACITY"

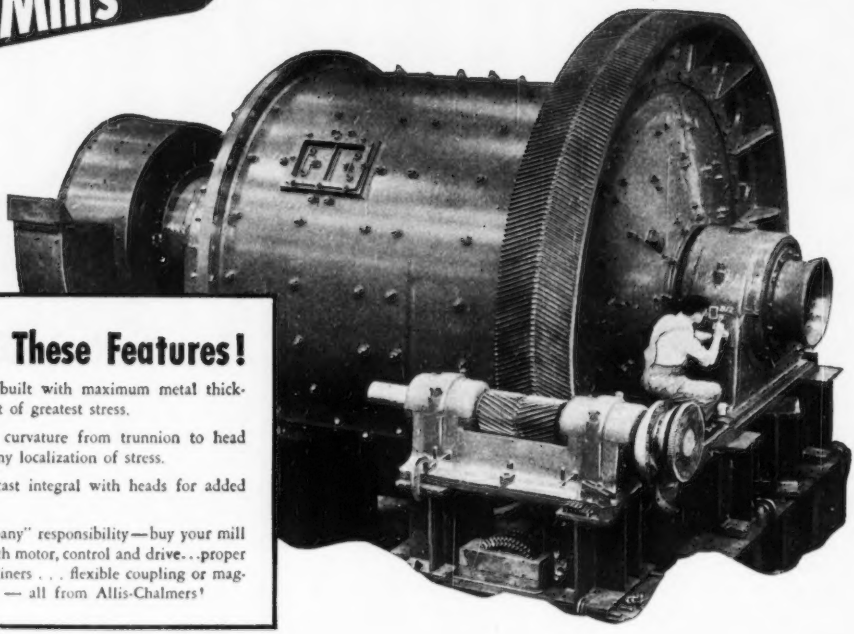
Ask your Koehring Distributor for specific information

KOEHRING HEAVY DUTY

7¾ to 79½ TONS lift capacity . . . ½ to 2½ yards dipper capacity

Overcome Problem of High Starting Torque

ALLIS-CHALMERS Grinding Mills



Check These Features!

- Trunnions built with maximum metal thickness at point of greatest stress.
- A gradual curvature from trunnion to head eliminates any localization of stress.
- Trunnion cast integral with heads for added strength.
- "One company" responsibility—buy your mill complete with motor, control and drive...proper feeder and liners . . . flexible coupling or magnetic clutch — all from Allis-Chalmers!

TRUNNION BEARINGS on all the larger sizes of Allis-Chalmers grinding mills are supplied with an individual high pressure lubricating pump to provide lubricant between mill trunnion and bearing during initial starting, insuring minimum starting torque and bearing wear.

Hand operated bearing lubricating pump.

Floating the mill in this way results in much less punishment to vital parts. Reduced starting torque gives you less strain on gear teeth and less torsional strain on the pinionshaft.

REDUCES DOWNTIME

Protection from excessive wear and strain in starting your mill will prove to be immensely important in terms of less costly maintenance and less idle mill time. Another reason it pays to specify A-C mills!

Allis-Chalmers builds a complete line of grinding mills: ball and rod mills; pebble mills, Compeb and Ballpeb mills. The A-C representative in your area can be a big help in working out grinding problems. Call him today, or write: A-3044

ALLIS-CHALMERS, 969A SO. 70 ST. MILWAUKEE, WIS.

Compeb, Ballpeb and *Texrope* are Allis-Chalmers trademarks.

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Controls

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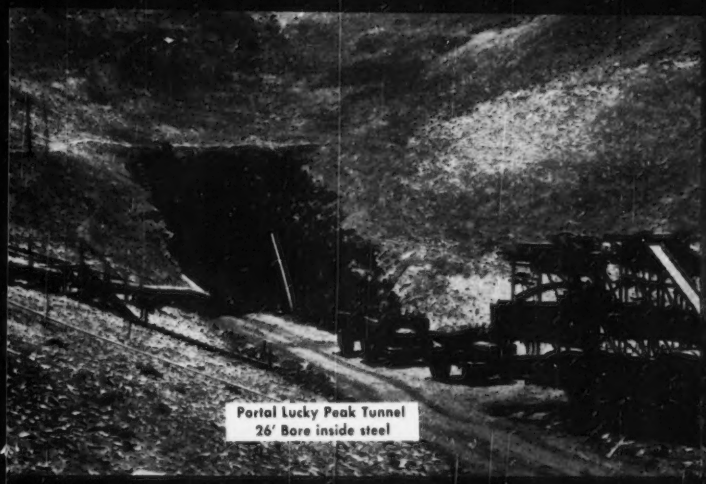
Crushers

Kilns, Coolers, Dryers



Portal Lucky Peak Tunnel
26' Bore inside steel

Eimco 104 RockerShovel at Lucky Peak

Lucky Peak Tunnel Project near Boise, Idaho, uses an Eimco 104 RockerShovel for mucking out the 26' bore.

"The 104 is faster and more efficient," says project superintendent Paul C. Guinn, a veteran tunnel driver running the job for the Macco Corporation and Puget Sound Bridge & Dredging Company joint contractors. Lucky Peak is Mr. Guinn's 59th tunnel.

The 104 loads the 8' rounds of blocky basalt rock in three hours using a 1¼ yard rock bucket . . . an average of twenty WD-60 Dumptor loads per hour.

Eimco 104 RockerShovels will cut the cost of loading on your job, too. Write for more information.

"In comparing loaders, the Eimco is a mucking machine," says P. C. Guinn, project manager.

EIMCO

THE EIMCO CORPORATION

The World's Largest Manufacturers of Underground Rock Loading Machines

EXECUTIVE OFFICES AND FACTORIES — SALT LAKE CITY 8, UTAH, U. S. A.

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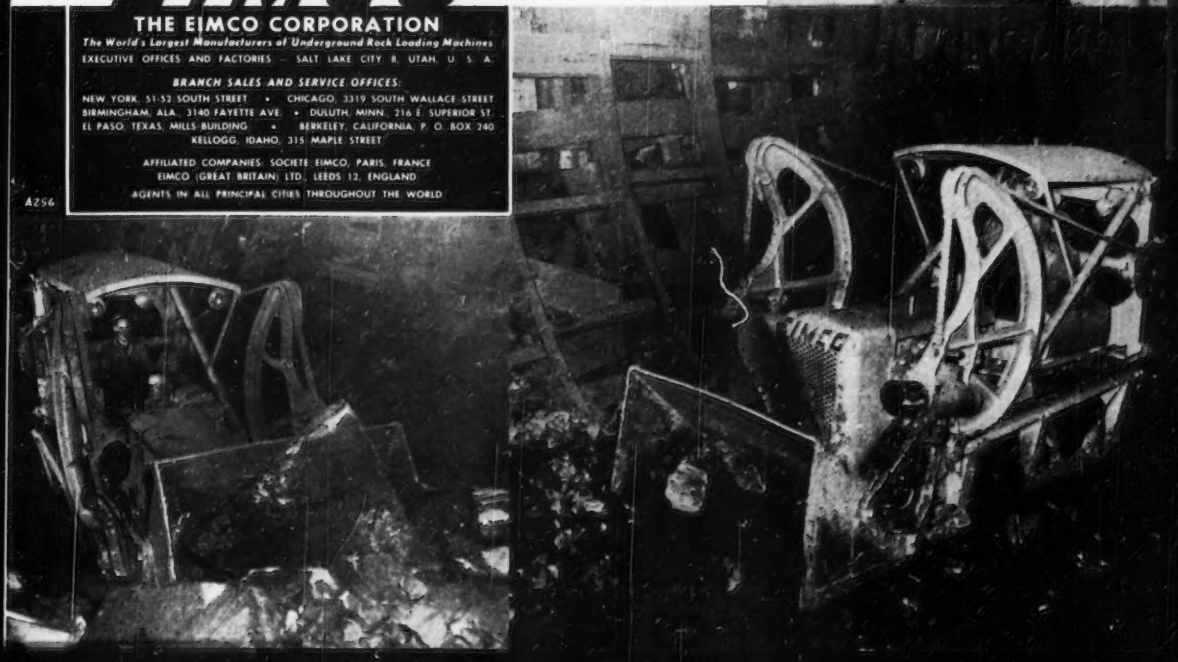


New POWER FEEDS for Thor DRIFTERS

SENSITIVE CONTROL...

- Fast feeds, slow feeds (as slow as 2 inches per minute!) rapid return and advance, all controlled from one infinitely variable throttle for top performance under all conditions.

- Carbide bit breakage virtually eliminated... even inexperienced drill runners can hold bit against bottom at correct feeding pressure to eliminate bouncing, hard vibration, bit breakage.

AMERICAN MINING CONGRESS EXPOSITION BOOTH 232

AMAZING POWER

On the job demonstrations of new Thor Power Feeds now being arranged! See how these powerful, precision controlled drive units can *save you money* — EXTRA FOOTAGE, LESS MAINTENANCE, FEWER STUCK STEELS, ALMOST COMPLETE ELIMINATION OF BROKEN BITS.

For use with powerful No. 82 and 92 Thor Drifters, new Power Feeds are available in three sliding cone shell lengths—24"x24"; 30"x30"; and in a new stress-proof aluminum shell, 48"x48", weighing actually less than the 30"x30" in steel!

Thor's tremendous advances in Drifting technique are worth investigating—write or wire for a Thor service engineer today! Independent Pneumatic Tool Co., Aurora, Ill.

NEW THOR TOOLS SPEED DRIFTING

AIR BAR FEEDS—for converting hand-feed drifters, and sinkers, to power feed. Simple, efficient.

SINKER LEGS—new "clamp-on" air feed leg permits sinkers to do double duty—drilling down holes and drifting. Standard or reverse feed.

PNEUMATIC COLUMNS—simplify drifter set-ups. Safety features prevent accidental collapse.

Thor PORTABLE POWER TOOLS

ELECTRIC • PNEUMATIC

- Air Feed Legs
- Backfill Tampers
- Belt Sanders
- Bench Grinders
- Chipping Hammers
- Concrete Surfacers
- Clay Diggers
- Drills
- Grinders
- Electric Hammers
- Impact Wrenches
- Paving Breakers
- Pin Driver
- Rock Drills
- Sanders
- Saws
- Sump Pumps
- Wagon Drills

SIX YEARS' SERVICE
Handling highly abrasive sand

Goodyear Dredging Hose Still Going Strong!

ROLLING down the rivers into San Francisco Bay there's a constant flow of highly abrasive grit, gravel and sand. This sedimental glacier would soon bar the rivers to navigation except for constant dredging, handled for the most part by suction dredges.

Back in '44, the G.T.M.—Goodyear Technical Man—specified a length of Goodyear Style M Sand Suction Hose for one of these dredges. After gulping its gritty diet for six years, this hose was examined recently—found to be in shape to handle tons of sand and gravel for years to come.

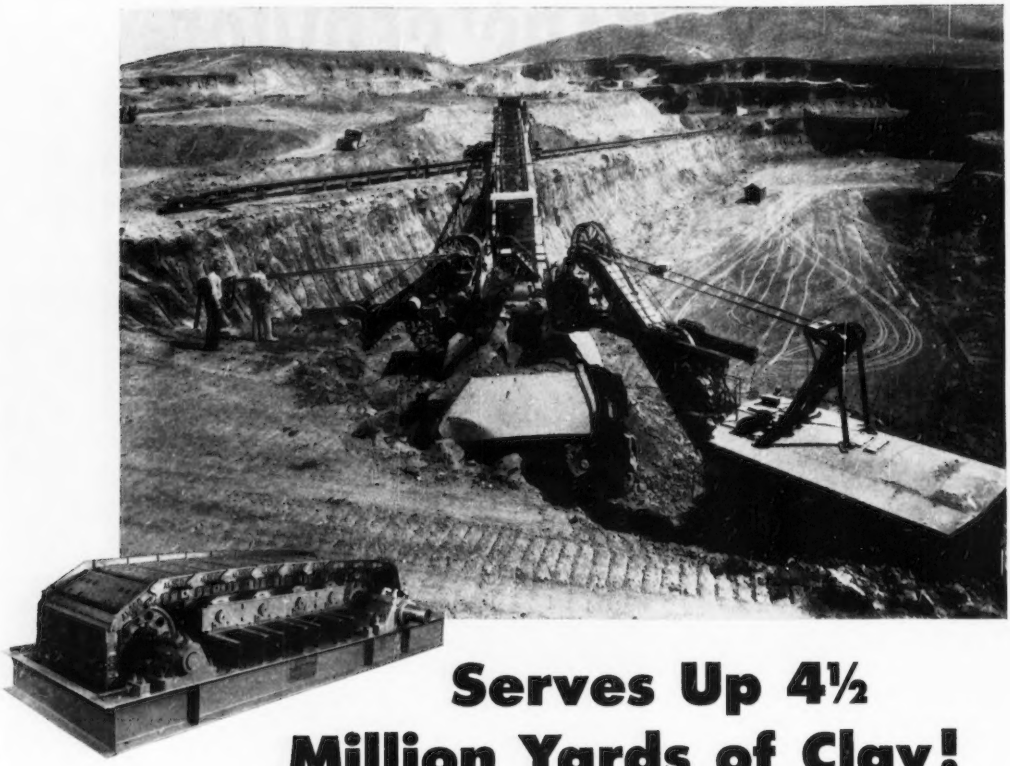
Whether your hose job is handling abrasives like sand, cement, ceramic materials—corrosives, oils, paints, or live steam—only *one* hose construction has the right combination of synthetic or natural rubber tube, reinforcement materials and covering to give you the longest, lowest-cost hose service. So turn to the man who knows hose best—the G.T.M.—for recommendations for your needs. Or write Goodyear, Akron 16, Ohio.

STYLE M SAND SUCTION HOSE
GOODYEAR INDUSTRIAL RUBBER PRODUCTS
-Specified STYLE M SAND SUCTION HOSE
A—Rugged, heavy-gauge cover resists gouging and scuffing.
B—Reinforcement of heavy-wrapped fabric plies armors hose against abuse.
C—High-tensile spiraled wire gives strength to withstand vacuum.
D—Extra-heavy tube of super-tough stock resists cutting and abrasion.

FOR HOSE, FLAT BELTS, V-BELTS, MOLDED GOODS, PACKING, TANK LINING built to the world's highest standard of quality, phone your nearest Goodyear Industrial Rubber Products Distributor.

GOODYEAR

THE GREATEST NAME IN RUBBER



Serves Up 4½ Million Yards of Clay!

ONLY 4500 HOURS WORK FOR "S-A" AMSCO PAN FEEDER

This dam construction job was no exception to AMSCO'S capacity "to take it" on the toughest jobs. A really heavy-duty unit was required for use under the receiving hopper of a portable field conveyor handling material from pit to main belt conveyor system serving dam site. This S-A AMSCO feeder was the logical choice. Heavy-duty operations require 4,500,000 yards of clay to be moved to the dam.

The extra-wide pans of the AMSCO prevent arching or blocking of the clay in the throat of the bin. S-A engineers have built tremendous strength and high-efficiency into this sturdy unit for lasting, trouble-free service. It's typical of S-A engineers to come up with practical answers to some of the toughest problems in low-cost material handling. What are your problems? Write today.

DAM CONSTRUCTION PROJECT

Clay is excavated by two 5-yard shovels. A shovel works on each side of the hopper for maximum capacity. Clay is dumped into receiving hopper which is part of a movable, pendulum-type conveyor which loads onto main 30-inch belt conveyor at any point. The 60-inch wide by 22-foot long AMSCO Pan Feeder has pans 1¼" thick. It is installed as a floor under the receiving hopper and feeds materials through an adjustable gate opening onto a chopping roll. There, revolving teeth reduce material to less than 6-inch lumps. The capacity of the "AMSCO" Feeder is 1000 cubic yards per hour.

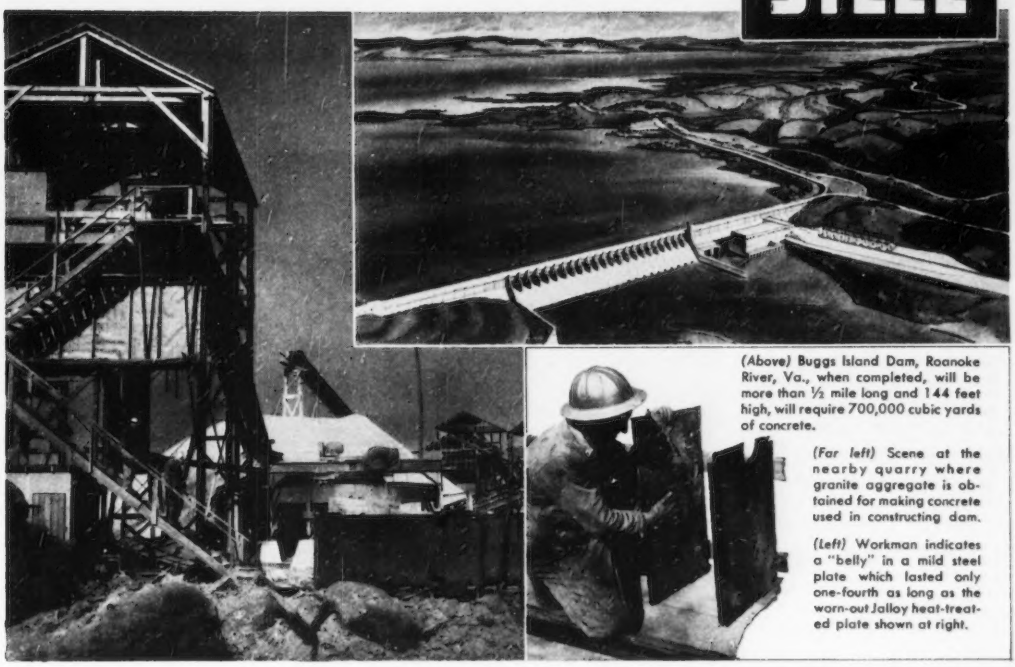
STEPHEN S-A DAMSON MFG. CO.

4 Ridgeway Avenue, Aurora, Illinois — Los Angeles, Calif. • Belleville, Ontario

DESIGNERS AND MANUFACTURERS OF ALL TYPES OF BULK MATERIALS HANDLING EQUIPMENT

$12,500 SAVED in construction equipment maintenance with first 45 tons of Heat-treated JALLOY STEEL PLATE

J&L STEEL



(Above) Buggs Island Dam, Roanoke River, Va., when completed, will be more than ½ mile long and 144 feet high, will require 700,000 cubic yards of concrete.

(Far left) Scene at the nearby quarry where granite aggregate is obtained for making concrete used in constructing dam.

(Left) Workman indicates a "belly" in a mild steel plate which lasted only one-fourth as long as the worn-out Jalloy heat-treated plate shown at right.

JALLOY Heat-Treated Plate lasts 4 to 5 times as long as mild steel in handling crushed stone for Buggs Island Dam

Buggs Island Dam, across the Roanoke River near South Hill, Va., is being constructed by Department of the Army, Corps of Engineers, Norfolk District. Granite is blasted from a quarry three miles from the dam site and crushed into various sizes. In moving and handling this hard abrasive rock, *worthwhile* savings are being made by using heat-treated JALLOY plate for: Chutes, screening equipment, truck bodies, shovel-dipper teeth and similar materials-handling applications.

At the quarry, operated by Ralph E. Mills and Gorman Bros., Inc., direct comparisons show that heat-treated JALLOY plate lasts an average of 5 times as long as mild steel. During the first 11 months, approximately 25 tons of JALLOY heat-treated plate were installed at the quarry.

At the dam, Jones-Tompkins-Wright, Contractors, installed approximately 20 tons of heat-treated JALLOY plate during the first 10 months of operations. Here JALLOY lasts on an average of 4 times as long as mild steel.

At both locations, approximately 45 tons of JALLOY heat-treated plate have effected a saving in the cost of steel for maintenance alone of more than $10,000. Labor savings in man-hours worked by maintenance crews have been conservatively estimated at more than $2,500.

Wherever heat-treated JALLOY plate is used to resist abrasion and impact, similar results are being obtained. Little wonder that this manganese moly steel is becoming so popular in materials-handling operations. Let us send you our booklet, "For Longer Wear . . . Less Repair." It describes how others are saving money with heat-treated JALLOY Steel Plate, The Mining and Quarrying Steel.

Jones & Laughlin Steel Corporation
412 Jones & Laughlin Building
Pittsburgh 30, Pa.

Please send me a copy of: "For Longer Wear . . . Less Repair—JALLOY—J&L Special Alloy Steel."

NAME_____

COMPANY_____

ADDRESS_____

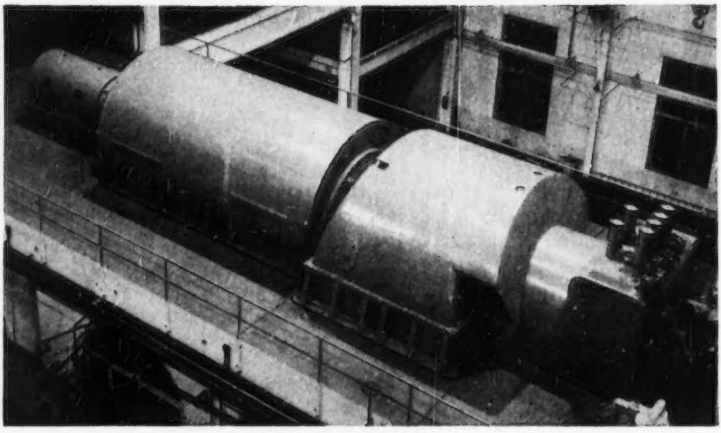
JONES & LAUGHLIN STEEL CORPORATION

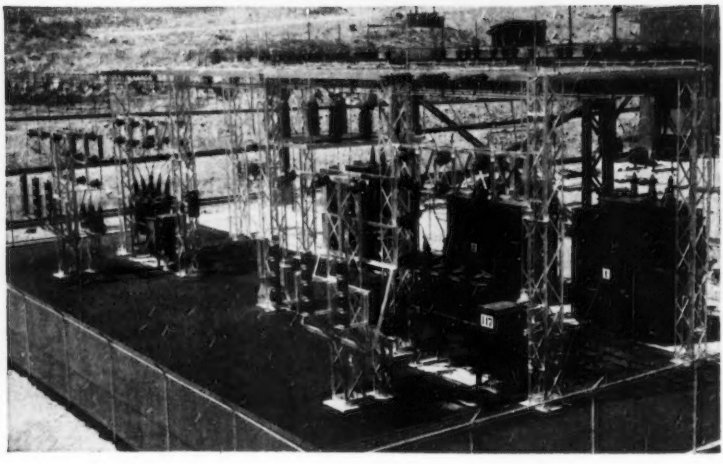
From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOLOY *and* JALLOY *(hi-tensile steels).*

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

Powered for low-cost high-tonnage refining!

1 Typical of the mining industry's increasing electrification to handle high tonnages at low cost is this new copper refinery at Garfield, Utah, which has a capacity of 12,000 tons of refined copper per month, with provision for expansion to 16,000 tons. Power for the refinery and other operations comes from Kennecott's power station, where three G-E steam turbine-generators (two of 25,000 kw each, plus the 50,000-kw unit shown here) generate 13.8-kv power which is stepped up to 44 kv for transmission.

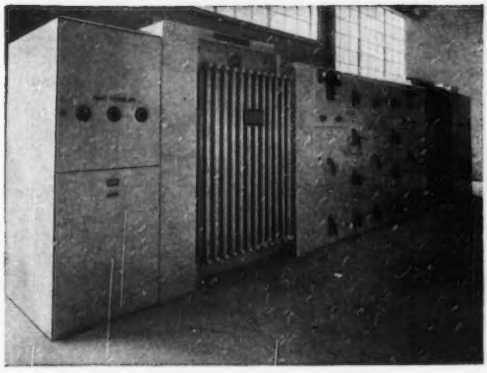




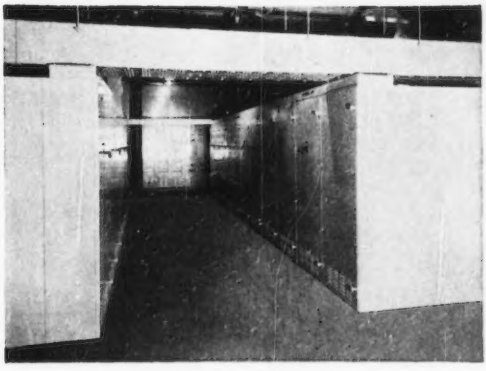
2 At the refinery, three miles away from the power plant, incoming 44-kv power is stepped down to 13.8 kv at this G-E package substation. Completely co-ordinated, it includes an outdoor steel switching structure, three 7500/9375-kva power transformers (with provision for addition of a fourth) and necessary metal-clad switchgear. G-E package substations, made in many standard combinations to fit all mining-industry needs, come in factory-built sections ready to install. They simplify ordering, save engineering time, speed installation, cut costs.

GENERAL ELECTRIC

In its new electrolytic refinery, Kennecott Copper Corporation uses this General Electric generation, conversion, and distribution equipment to help maintain production continuity

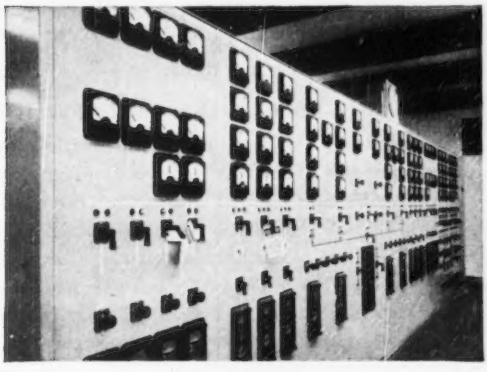


5 Four G-E 1500-kva double ended load-center substations (one shown) step down voltage from 13,800 to 480 and provide distribution at centers of load to reduce power losses.

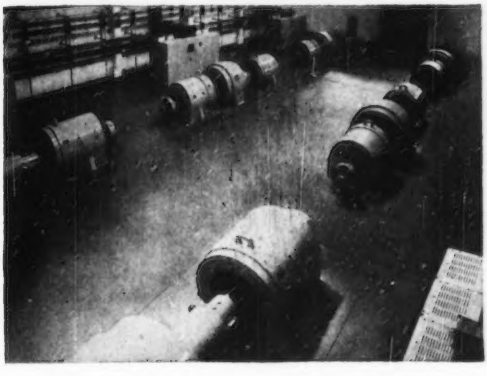


3 Inside the refinery, protecting all 13.8-kv feeders and personnel as well, is this G-E metal-clad switchgear that provides flexibility for future load changes.

6 This G-E panel — controlling package substation, a-c switchgear, and d-c power for electrolytic cell lines — helps centralize and co-ordinate plant operations.



4 A-c is converted to d-c for electrolytic cell lines by six G-E motor-generator sets, each including a 2900-hp synchronous motor and two 1000-kw, 125-volt d-c generators.

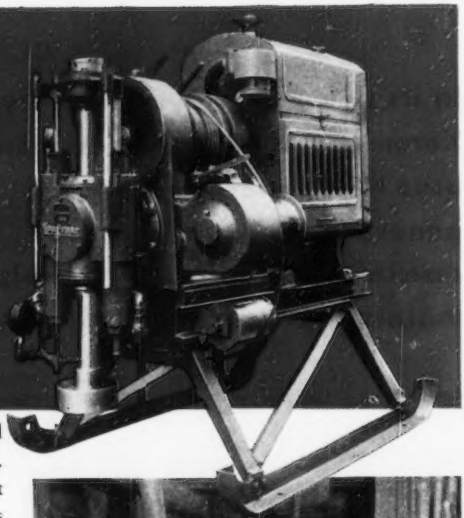


CO-ORDINATED POWER SYSTEMS

for the Mining Industry

Whatever your mining or processing problem, a good man to know is the mining industry specialist in your nearby G-E office. Ask him about power-system equipment for *your* plant to protect service continuity, help boost production, cut costs. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

IT'S THE *Built-in Quality* THAT COUNTS



That's why Longyear insists on selected materials, and precision machining in building diamond core drills. Here are examples of parts or processes that must meet critical tests: sound castings, high-grade alloys for gears and shafts, perfect alignment, precise tolerances, quality bearings, thorough lubrication. These features give Longyear drills endurance, steady performance, economical operation. Select any Longyear model and know that goodness goes all the way through.

ECONOMY RESULTS FROM BUILT-IN QUALITY

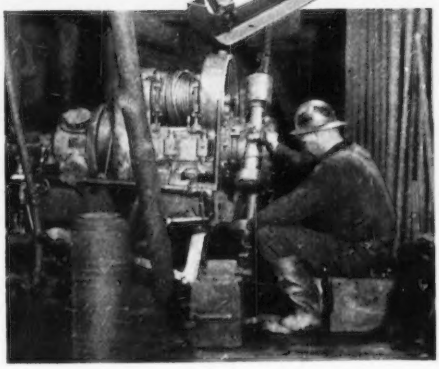
The Junior and UG Straitline core drills illustrated are popular models. They repeatedly demonstrate to users the value of sound internal construction. Operators are getting STEADY DRILLING PERFORMANCE, and LARGER FOOTAGES per shift because there are no break-downs due to inferior materials or workmanship. These factors add up to OPERATING ECONOMY. The word gets around. That is the reason for new orders, and why repeat orders keep coming in. Think it over and let us quote you on suitable drill equipment for your next job.

CORE DRILLS AND SUPPLIES

Longyear manufactures a complete line of core drills—large or small, for surface or underground use. There is a quality-built model suited to your needs.

Also, quality-built diamond drill accessories and standard supplies are available from stock.

Write us for specific information.



Upper Picture—Junior Straitline, Diesel Driven
Capacity: 1000′ of EX core or 800′ of AX core

Lower Picture—UG Straitline, Air Driven
Capacity: 2000′ of EX core or 1600′ of AX core

Each model is equipped with screw feed or hydraulic drilling head; also may be supplied with air, electric, gasoline or Diesel motive power.

Remember, we do core drilling under contract. You may prefer to use this service rather than to buy drills. Consult us on your requirements.

E. J. LONGYEAR COMPANY

MINNEAPOLIS, MINNESOTA, U.S.A. NEW YORK OFFICE, 1775 BROADWAY

CANADIAN LONGYEAR, LIMITED, NORTH BAY, ONTARIO, CANADA

DIAMOND CORE DRILLS • CONTRACT CORE DRILLING
SHAFT SINKING • GEOLOGICAL INVESTIGATIONS

REPRESENTATIVES IN PRINCIPAL MINING CENTERS IN THE UNITED STATES AND OTHER COUNTRIES

HUNGRY HORSE DAM FED BY "U.S." BELTING

Nearly 6 million tons of sand and gravel will be carried to site of mammoth job in Northwestern Montana—on U. S. Rubber Belting

NEARLY THREE MILES of U. S. Rubber Conveyor Belting, varying in width from 24" to 42", is used in all the phases of aggregate processing at the Hungry Horse Dam. Above is shown a series of the belts carrying sized materials to the storage piles.

UNITED STATES RUBBER ENGINEERS worked with the constructors of the dam and the designers of conveyor equipment to produce this highly efficient conveyor system. ALL the belting used to "feed" Hungry Horse was furnished by U. S. Rubber.

A FEW OF GIANT crates in which belts were shipped give an idea of the tremendous footage of belting—over 15,000 feet—used at Hungry Horse, country's third largest concrete dam when completed. It is being built for the U. S. Bureau of Reclamation.

Whenever you have a problem involving materials handling, no matter how big or small, get in touch with our engineers. They will gladly cooperate with your own men in working out a solution. Write to:

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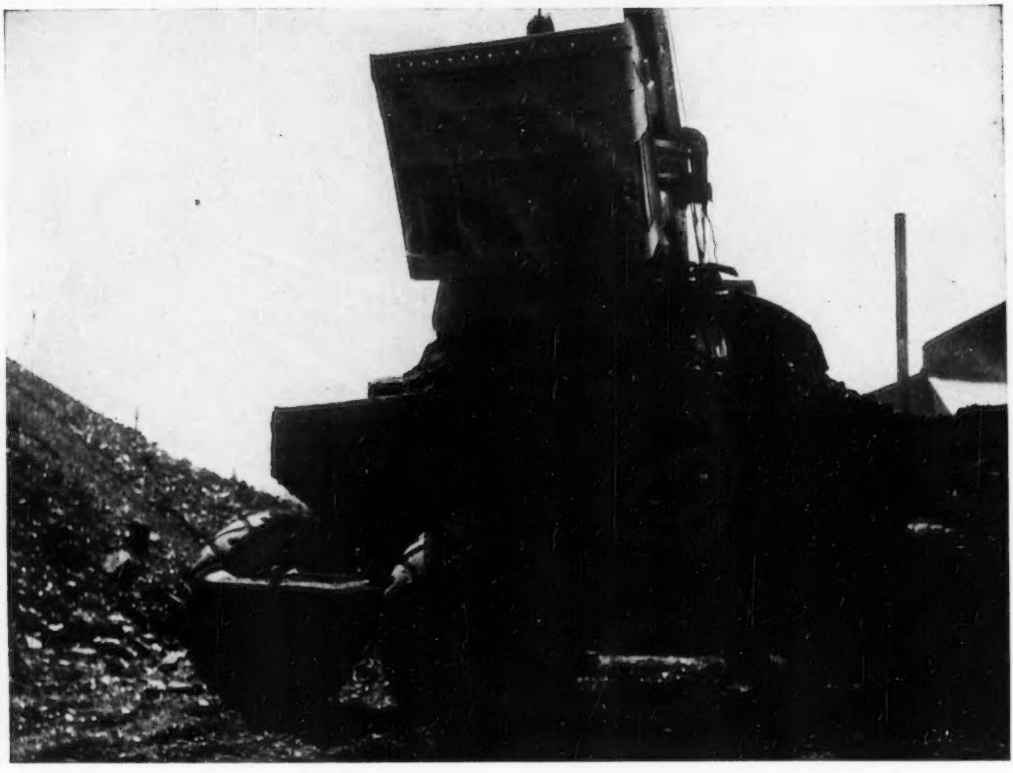
U.S.RUBBER
SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

B.F.Goodrich



ALL-NYLON tire record:

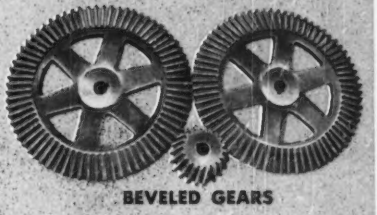
no blowouts, no bruise breaks, no flex breaks!

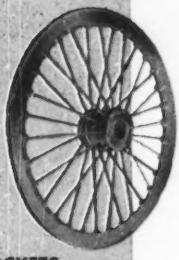
THE B. F. Goodrich ALL-NYLON tire is proving successful in mining operations all over the country. The record speaks for itself — up to now no blowouts, no bruise breaks, no flex breaks! And that includes severe operating conditions in mines where flex and bruise failures formerly were common.

Along with nylon, BFG uses weftless construction; no cross-threads in tire plies to hamper cord action and allow some cords to stretch out. Therefore, tire growth is reduced—tires last longer.

Where tire costs are high because of blowouts, flex breaks and bruise breaks, B. F. Goodrich all-nylon tires can make definite savings.

The new, all-nylon construction (used in the *Universal* and *Rock-Logger* tires shown at right) is typical of the continuous improvements being made in tires by B. F. Goodrich. Long ago, BFG engineers developed special types of tires for mining service. For more information on the way B. F. Goodrich tires can do more work and save you money, call your BFG dealer — or write directly to *The B. F. Goodrich Company, Akron, Ohio.*





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- CRUSHER ROLLS
- JAW PLATES
- CRANE WHEELS
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- CUT TOOTH GEARS
- SHEAR BLADES
- TABLE GEARING

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Since 1916!

Specialists in the fabrication of gears, tires, trunnions, sprockets and allied parts for kilns, coolers, dryers, ball mills and similar processing equipment . . . Stroh engineers have perfected a method of applying a high grade, wear-resistant alloy steel to *the wearing surfaces* only of plain carbon steel. Proved in service . . . replacement parts by Stroh assure you of maximum service life . . . economical, smooth operation of equipment. Let us show you case studies of outstanding performance. A representative will gladly call at your request, or we will quote on your requirements on receipt of your inquiry.

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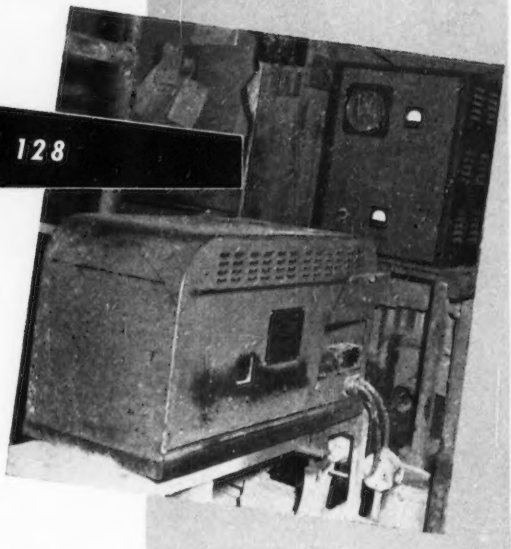
SEE THE MASSCO *Circuitron*

BOOTH NUMBER 128



At the Salt Lake Mining Show you will see the Circuitron, a sensitive mechanism for determining and controlling proper feed rate for optimum closed circuit grinding. The electronic device takes into account both the grinding mill load and the classifier sand load, greatly simplifying mill operation.

Other world famous equipment manufactured by Mine & Smelter for the mining industry includes: Marcy ball, rod and tube mills, Wilfley concentrating tables, Massco-Fahrenwald flotation machines, Massco-Grigsby rubber pinch valves, Massco Gy-Roll laboratory reduction crushers, rock bit grinders and hot millers, density controllers, Massco-McCool laboratory pulverizers and Massco crushers, belt feeders.

Through its territorial offices Mine & Smelter is also a jobber of outstanding lines of mine and mill machinery, electrical equipment and supplies, chemical, assay and laboratory supplies and equipment, industrial supplies, and equipment for complete milling plants. Ask for MASSCO literature on all your requirements.

Representatives: Canadian Vickers, Ltd., Montreal; W. R. Judson, Santiago and Lima; The Edward J. Nell Co., Manila, P.I.; The Ore & Chemical Co., 80 Broad St., New York 4, N.Y., for Continental Europe.

THE *Mine & Smelter* SUPPLY COMPANY

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"WE GOT MIGHTY TIRED SITTING UP NIGHTS WITH SICK BELTING

Then we tried the Thermoid treatment! Now we're sitting pretty!"

"Here at the Quarry we operate 9 hours a day, 6 days a week. Our conveyor belting on flight No. 1—where the belting really takes a beating from big, jagged, saw-toothed rocks—was giving us plenty of trouble.

"Because of our long work-week, the men began grumbling about having to put in so much extra time late at night repairing rips and tears in this beat-up belting.

"So we called up our belting distributor and he brought a Thermoid engineer around. 'What you need,' said the engineer, 'is Thermoid "H.T." belting with a special soft rubber ply that will cushion those rocks like a cradle.'

"That was several months ago. Now, after watching that Thermoid 'H.T.' belting take the most savage pounding imaginable, we know it is a quality product that can be depended on to stand up under plenty of slam-bang punishment.

"If you have a belting problem, Mister, why not get in touch with your Thermoid distributor. Whether your problem is run-of-mill or highly specialized, he'll help you solve it—efficiently and economically."

A Complete Line of Quality Rubber Products For All Industrial Needs

In addition to Conveyor Belting, Thermoid makes Transmission Belting, F.H.P. and Multiple V-Belts, Elevator Belting, and a complete line of Wrapped and Molded Hose, Industrial Brake Linings and Friction Materials.

It will pay you to *Specify* Thermoid!

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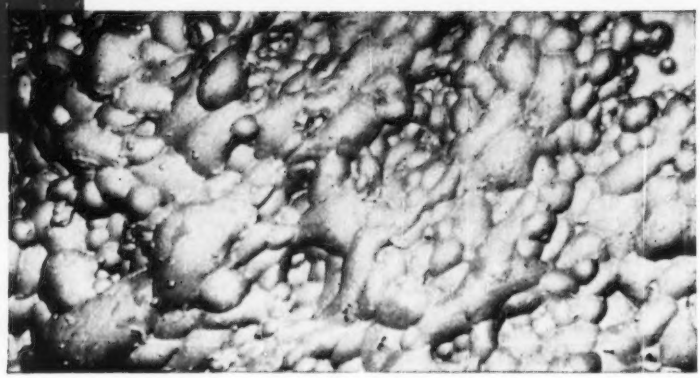
Dependable Bear Brand Xanthates

"Over Twenty-Five Years' Experience in Producing Xanthates for Metallurgical Use."



BEAR BRAND XANTHATES AVAILABLE

- **Z-3—Potassium Ethyl Xanthate**
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- **Z-6—Potassium Pentasol Amyl Xanthate***
- **Z-8—Potassium Sec.-Butyl Xanthate**
- **Z-9—Potassium Isopropyl Xanthate**

*From Sharples Amyl Alcohols

Time and experience have demonstrated that for optimum results in the flotation treatment of substantially all sulphide ores, as well as some oxidized ores and ores containing native metals, Bear Brand Xanthates are the cheapest and most efficient collectors now available.

Great Western Division
THE DOW CHEMICAL COMPANY
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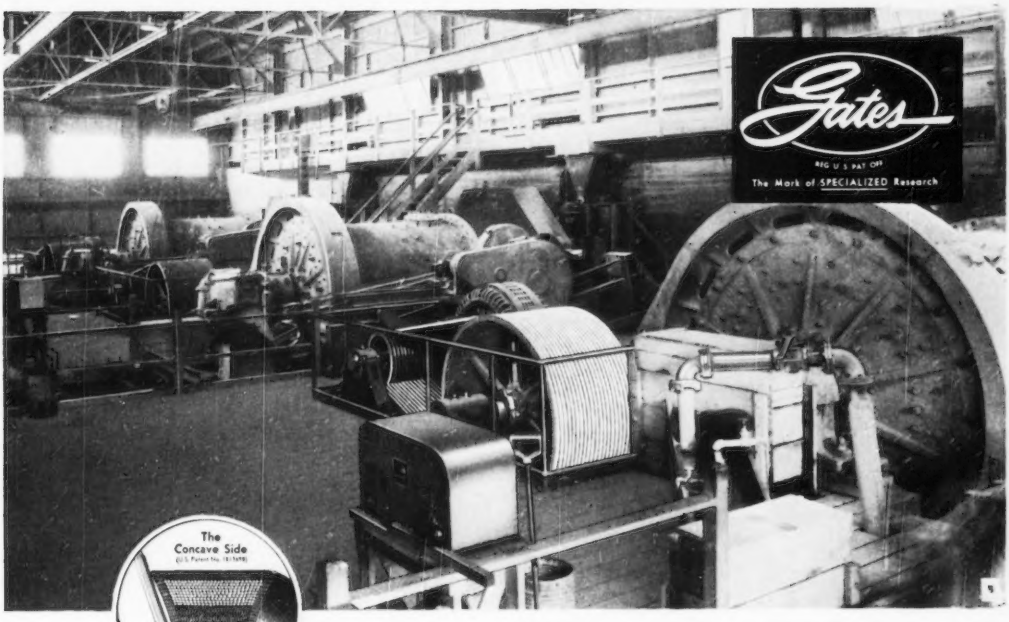
INDISPENSABLE TO INDUSTRY AND AGRICULTURE



Profits of Bagdad Copper Corporation's isolated Arizona plant depended on maintaining economical and trouble-free operation. They chose the Gates Vulco Rope Drives (shown) for these big ball mills because of their proven ability to handle this rugged service. Also, because the failure of one belt would not necessitate a shutdown, but would give ample notice when a replacement set of belts was needed.

Let this simple test tell you exactly WHY the Concave Side cuts your V-Belt costs

To see for yourself the belt-saving importance of the Concave Side, just pick up *any* V-belt and bend it as it bends when it goes around a pulley.

As the belt bends, grip its *sides* firmly with your fingers. You will feel the sides of the belt *change shape*. This is because the top of the belt is under tension and, hence, grows *narrower* while the body, under compression, *bulges out*. (See figure 1 and 1-A)

Now look at figures 2 and 2-A. There you see how the bending changes the shape of the belt that is built with the Concave Side —The Gates Vulco Rope. The concave sides of this belt merely *fill out* and become perfectly *straight*. There is no side-bulge. This belt, when bent, *precisely fits its sheave groove*.

A very distinct saving in belt wear results. No side-bulge means that the sides press *evenly* against the V pulley and therefore wear *uniformly*—resulting in longer life for the sidewall and, naturally, *longer life for the belt!*

If you care about cutting your belt costs, it will pay you to make sure, whenever you buy V-Belts, that you get the V-Belt with the Concave Sides...the Gates Vulco Rope!

What Happens When a V-Belt Bends

Straight-Sided V-Belt

How Straight-Sided V-Belt Bulges in Sheave-Groove. Sides Press Unevenly Against V-Pulley Causing Extra Wear at Point Shown by Arrows.

Gates Vulco Rope with Concave Side

The Concave Side Fills Out to a Precise Fit in the Sheave Groove. No Side Bulge! Sides Press Evenly Against the V-Pulley—Uniform Wear—Longer Life!

CS-508

THE GATES RUBBER COMPANY
DENVER, U.S.A.
World's Largest Makers of V-Belts

GATES VULCO ROPE DRIVES
Engineering Offices and Jobber Stocks IN ALL INDUSTRIAL CENTERS of the U.S. and 71 Foreign Countries

CURRENT REAGENT PRACTICE ON COPPER ORES

For the efficient treatment of non-refractory copper ores, Aerofloat* Flotation Reagents have long been favored by many leading producers because of their high selectivity, wide tolerance to changes in feed mineralization and the small amounts required to achieve optimum recovery.

Less well known is the use of Aerofloat Flotation Reagents (alone or in combination with other promoters) to recover copper values from refractory ores, especially where the selectivity of the reagents is of prime importance.

Data on the reagent combinations used for copper recovery have been reported from time to time in technical papers given before ore-dressing groups throughout the mining world. But much of that data is no longer current nor conveniently available to individual mill metallurgists and managers.

*Aerofloat is a registered trademark of American Cyanamid Co. applied to certain flotation reagents of its manufacture.

The Cyanamid Mineral Dressing Laboratory will soon issue an 8-page Technical Bulletin containing interesting resumés of the application of Cyanamid Reagents to a variety of copper ores in Canada, Mexico, South America, Africa, Australia and the United States.

Described are diversified applications of Cyanamid Reagents to ores having such mineral associations as:

Bornite with Chalcopyrite
Chalcopyrite with Pyrite
Chalcopyrite associated with Sphalerite, Pyrrhotite and Pyrite
Chalcopyrite with Magnetite and Pyrite
Chalcopyrite with Galena and Sphalerite
Bornite with Chalcopyrite, Enargite, Tennantite and Chalcocite
Chalcopyrite, Covellite with Galena, Pyrite, Siegenite, Bravoite and Marcasite

Reagent combinations and feed-rates are given in detail with explanatory comment. Examples include both large and small operations and ores with values as low as 0.60% Cu.

Presenting timely, helpful data on the efficient use of Cyanamid Reagents is an integral part of our complete service to mills the world over. It is a logical extension of the work of the Cyanamid Mineral Dressing Laboratory in the creation of new reagents and the development of flow-schemes for the efficient treatment of difficult ores. It supplements the work of Cyanamid Field Engineers in the practical application of our reagents and processes on your mill.

AMERICAN *Cyanamid* COMPANY

Mineral Dressing Division
30 Rockefeller Plaza New York 20, N. Y.

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Because of the specialized content of this booklet, it will not be sent to all those who normally receive copies of *Mineral Dressing Notes*. If you have an immediate or general interest in froth flotation, we will be pleased to send you a copy without cost or obligation. The coupon below is for your convenience.

Also Available
Mineral Dressing Notes #15
FLOTATION REAGENTS

If you do not have this 44-page booklet giving the properties and applicability of all standard Cyanamid Reagents, we will be pleased to send a copy.

☐ Kindly send me a copy of your forthcoming booklet, "CURRENT REAGENT PRACTICE ON COPPER ORES"
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How to simplify your piping jobs ...Standardize on the CRANE line

No. 793½, Outside Screw and Yoke. Working Pressures: 25 pounds steam or gas; up to 50 pounds cold water. Sizes: 10 to 48-inch.

ECONOMICAL VALVES FOR LOW PRESSURES

Keep Crane 25-Pound Iron Body Double Disc Gates in mind for services that don't require the usual 125-Pound valves. Rated at 25 Pounds Steam or Gas, and up to 50 Pounds Water, depending on size, they give superior service in a wide variety of applications. Use them inside or out; their oval-shaped body and bonnet have ample reserve strength under line stresses. Short and compact, they take minimum space in pipe lines.

For durable, tight seating—yet easy opening—seat rings and disc faces are brass. Crane 2-piece ball-type gland maintains uniform pressure on packing; prevents binding on stem; lengthens packing life. When specified, these valves can be fitted with gears, by-pass, and clean-outs; also can be motor or cylinder operated; non-rising stem, flanged or hub ends, up to 36-in.; O.S. & Y. type with flanged ends only up to 48-in. See your No. 49 Crane Catalog.

CRANE CO., 836 S. Michigan Ave., Chicago 5, Ill.
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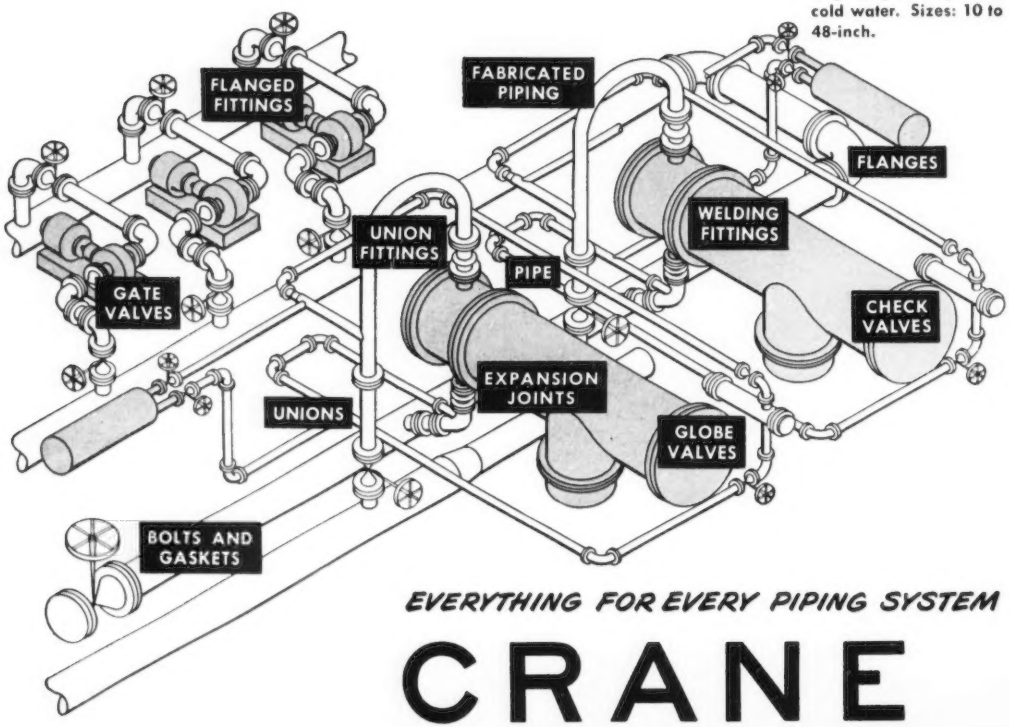
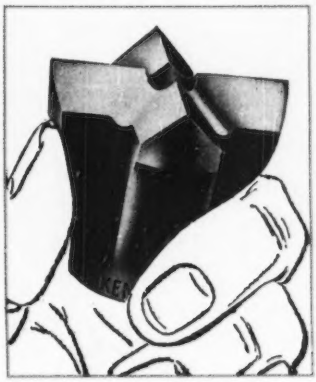


EVERYTHING FOR EVERY PIPING SYSTEM

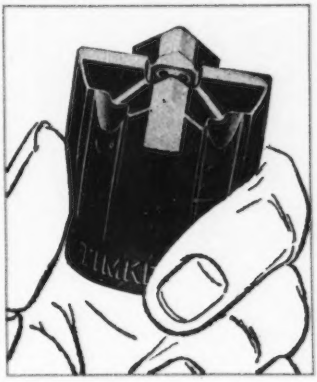
CRANE

VALVES • FITTINGS • PIPE • PLUMBING AND HEATING

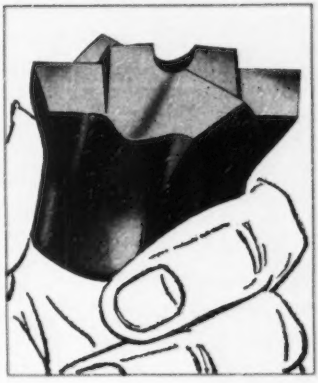
Only TIMKEN® offers all 3 types of rock bits...



1. **MULTI-USE** Basic removable rock bit for 18 years. Gives lowest cost per foot of hole when full increments of drill steel can be drilled and when control and reconditioning of bits are correct. Low cost! Requires less policing than carbide insert bits.



2. **CARBIDE INSERT** For extremely hard and abrasive ground, small holes, extra deep holes. Gives you more drilling time —less time changing bits. Holes go down faster. Reconditioning is simplified. Offers many advantages which compensate for higher unit cost.



3. **ONE-USE "SPIRALOCK"** For use where reconditioning is impractical or undesirable. Offers lowest unit bit cost. New "Spiralock" union holds bit dependably —permits easy removal. Simplifies drill steel preparation. More bit applications per drill steel.

and a complete Rock Bit Engineering Service!

WHICH bit is your best bet? Timken makes *all three* types—multi-use, carbide insert and one-use "Spiralock"—in a variety of series and sizes. And to help you choose the one bit that's best for your job, Timken offers a *complete* Rock Bit Engineering Service. Timken has been solving rock bit problems for over 17 years and our Rock Bit Engineering Service is qualified to help solve your problem. Whether you're looking for lower bit cost, lowest cost per foot of drilled hole, greatest possible drilling speed or any other advantage, our engineers, with *all three* types of rock bits to draw upon, can find the answer for you.

The Timken Rock Bit Engineering Service is at your disposal. For information and help, contact The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".

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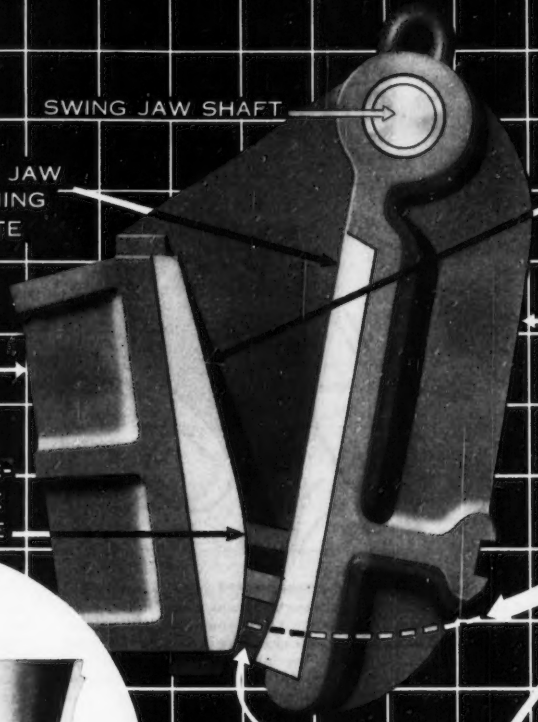
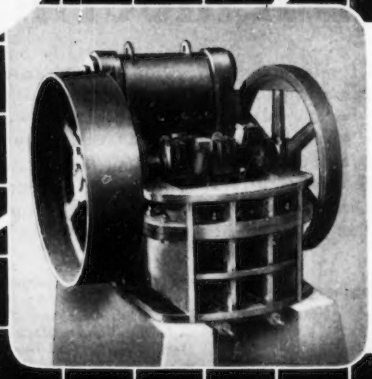
...your best bet for the best bit ...for every job

FREE BOOKLET: *Everyone who buys rock bits should have a copy. Gives full information on all three types of Timken rock bits and the Timken Rock Bit Engineering Service. Shows full line of bits in actual-size photographs, with detailed descriptions. Write The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".*

REDUCE COSTS . . . NIP BIGGER PROFITS


SWING JAW SHAFT
SWING JAW CRUSHING PLATE
FRONT CRUSHING PLATE
SWING JAW
MAIN FRAME
CURVED FACES CHECK LIFTING ACTION . . INCREASE CRUSHING FORCE
DIRECTION OF MOTION
GREATER CAPACITY IN EACH SUCCEEDING FEEDING ZONE PREVENTS PACKING AND CHOKING



CURVED CRUSHING SURFACES SEND PRODUCTION CURVES SOARING

THE TRAYLOR HB JAW CRUSHER

The Traylor HB crusher is an unusually modern and efficient breaker. Besides the Traylor patented curved jaws that alone add greatly to its crushing efficiency and profits, the Traylor HB features: A Traylor safety device that eliminates the possibility of breaking any important part of the crusher, a scientifically reinforced welded steel plate frame that permits easy inspection and facilitates repairs, a rod type pitman of known strength. Sizes: 36 x 42 to 56 x 72. Write for Bulletin 3105.

WITH

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Jaw and Reduction CRUSHERS

The smooth-faced curved jaw plates of all Traylor jaw crushers employ the same non-choking principle famous in the Bell Heads and Curved Concaves of Traylor reduction crushers. A more efficient application of crushing force in the crushing zone increases production and secures a finer, more uniform product with a lower power-per-ton factor. With this combination of greater output, superior product and lower power costs, Traylor operators enjoy a distinct competitive advantage.

Traylor Engineering Pays Off In Profits

Before you buy a crusher, it will pay you to investigate the profit-making advantages that Traylor's advanced engineering makes available in both jaw and reduction crushers for all crushing operations. Detailed, illustrated bulletins are available upon request. Why not write us today?

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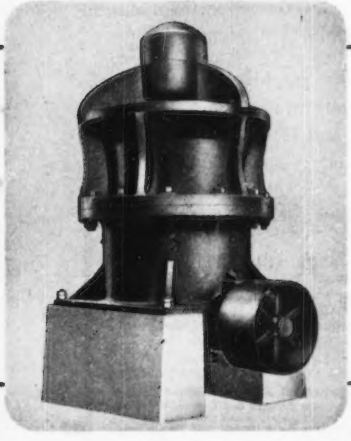

THE TRAYLOR TY REDUCTION CRUSHER

Traylor TY's are profit makers in every detail. Exclusive self-tightening, non-chokable bell head and curved concaves produce greater tonnages of finer, more uniform product at lower cost. Traylor TY's feature an all cast steel frame with upper shell and spider cast in one piece, a superior dust seal and automatic force feed lubrication system. Compact, simple in design, easy and economical to operate, the Traylor TY is a profit-making reduction crusher of modern and advanced design throughout. Sizes 1'8" to 5'6". Write for Bulletin 5112.

Traylor

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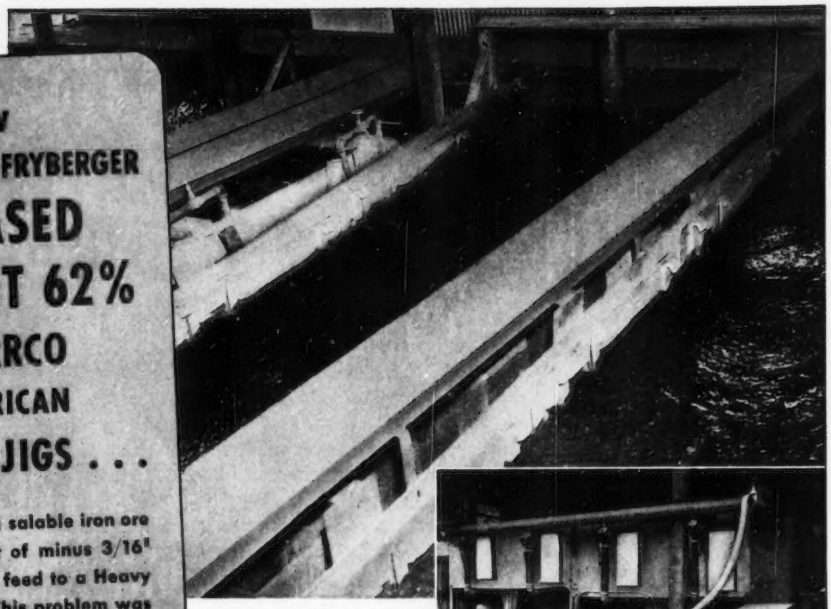
FEEDERS · KILNS · COOLERS
DRYERS · GRINDING MILLS

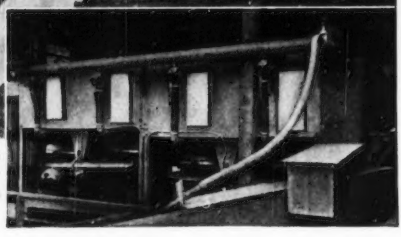
A "Traylor" Leads to Greater Profits

here's how RHUDE and FRYBERGER INCREASED OUTPUT 62% with DORRCO PAN-AMERICAN PLACER JIGS . . .

How to make a salable iron ore concentrate out of minus 3/16" undersize from feed to a Heavy Media Plant? This problem was economically solved at Rhude and Fryberger's Pennington Mine by sixteen balanced 42" x 42" Dorrco Pan-American Placer Jigs.



Portion of Dorrco P-A Jig circuit at Rhude and Fryberger looking directly across Jigs.



Side view of one 4-cell block at Rhude and Fryberger.

HERE'S THE FLOWSHEET:

Feed from the crusher is screened and the plus 3/16" material conveyed to the HMS Plant. The minus 3/16" undersize which is too fine for dense media treatment is first deslimed and dewatered to a 2:1 water/solid ratio, and then split evenly to four end-flow blocks of Dorrco P-A Placer Jigs, each block containing four cells in series. Approximately 30% of the total feed is jigged; 45% goes to the HMS Plant and the remaining 25% is discarded as slime.

HERE ARE THE RESULTS . . . Approximately 55% of the 800 TPD Jig feed is recovered as a concentrate averaging 53—54% Fe and 12—13% silica. The total plant output has been increased 62% over that obtained by Heavy Media Separation alone.

Equally important, Supt. P. H. Ramsden states that the operating results of the Jig Plant on fine ore are slightly superior to those obtained on the course fraction being treated by HMS.

These results graphically illustrate the complementary functions of Dorrco P-A Placer Jigs and HMS Plant for iron ore concentration.

Bulletin #2401, just off the press, contains 16 pages of detailed information on this modern unit. A copy is yours for the asking.

DORRCO

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BARRY PLACE, STAMFORD, CONN.
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YOU, TOO, CAN GET...

Maximum Output from Portable Electrical Equipment

...If You Look To Input First!

Without a steady input of power, even the best electric machines, tools, and appliances fall short of top performance. And without portable cords and cables that will stand up under every operating condition you can't get steady input.

To meet the need for long, trouble-free service on all operations, Simplex-TIREX Cords and Cables are carefully designed with an eye to flexibility, electrical stability, and safe operation, and to assure toughness are jacketed exclusively with Selenium Neoprene Armor. Here's a compound that has proved itself under the most severe conditions of mining, construction, shipbuilding, and shop work to be unexcelled for balanced resistance to oils, grease, acids, moisture, flame and sunlight. It is CURED-IN-LEAD to gain extra toughness and assures effective resistance to abrasion, crushing, and twisting. When your portable apparatus is TIREX-equipped, Selenium Neoprene Armor provides security against untimely breakdowns and low output.

TIREX Cords and Cables are made in sizes and types to meet all specifications. For complete information and help in selecting those best suited to your needs, specify your choice of TIREX catalogs on the coupon below and return it today.

SIMPLEX

WIRE AND CABLE CO.
79 Sidney St., Cambridge 39, Mass.

SIMPLEX WIRE & CABLE CO.
79 SIDNEY ST., CAMBRIDGE 39, MASS.

GENTLEMEN: PLEASE SEND THE CATALOG(S) MARKED

☐ TIREX CORDS ☐ TIREX 600 V. CABLES ☐ TIREX HI-VOLTAGE CABLES

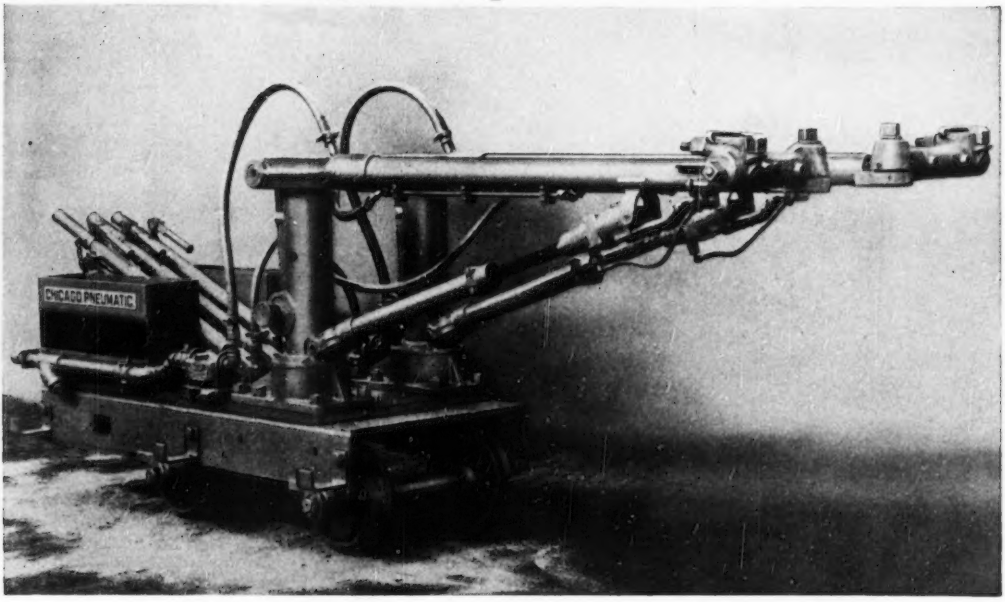
NAME_____ TITLE_____

COMPANY_____

STREET_____

CITY_____ STATE_____

CP equipment to



New! Air Actuated Drill Jumbo

A rail-mounted, twin-boom unit for mine headings up to 10′ x 12′, with such outstanding features as —

- **Dual control valves that permit operator to control booms from either side of boom arms**
- **Vertical adjustments controlled by air-operated actuators**
- **Automatic safety locks that eliminate any tendency of boom arms to settle**
- **Offset drill saddles that permit running of lifter holes without swinging the drill under the arm**
- **Rail car that can be furnished for any standard gauge track.**

Write for further information

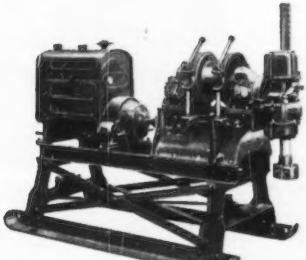
increase tonnage

For faster drilling – New rotary air motor makes CP-55 Diamond Drill unrivaled for speed and power. Easy to handle; weighs only 160 pounds; economical of air. Conservatively rated at 500 feet with EX fittings. Designed for coring, non-coring and blast hole operations.

Requires no priming – Operates effectively from a 60 c.f.m. compressor at pressures as low as 40 pounds. Operating from a 105 c.f.m. compressor at 80 pounds pressure against a 50-foot head, its capacity is 225 gallons a minute.

Handles water containing 15% solids – Water containing high percentage of sand or rock cuttings will not damage mechanism of CP-7 Portable Sludge Pump. Pump has maximum head of 200 feet and maximum suction lift of 20 feet.

Speed roof bolting – For tightening nuts on all types of suspension roof bolts CP Reversible Air Impact Wrenches are big time-savers. Capacities: CP-365 for nuts to 1¼" bolt size; CP-3630 for nuts to ¾" bolt size.



For surface prospecting – Skid-mounted, the gasoline-driven CP-8 Diamond Core Drill is readily moved from hole to hole under its own power. Has 900 feet capacity with EX fittings. A model with 1750 feet capacity is also available.

See this equipment in
Booth 723 • Building No. 10
American Metal Mining
Convention and Exposition

The exhibit will also include Sinker Drills . . . Stopers . . . Rotordrifters . . . Demolition Tools . . . Winches . . . High Speed Electric Saws . . . and a wide range of Pneumatic Tools for mine use.

CHICAGO PNEUMATIC TOOL COMPANY
General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

Symons Cone Crushers

. . . Proved in METALLIC ORE REDUCTION

Finer Crushing—Greater Capacity—Uniformly Sized Ball Mill Feed have won for the Symons Cone outstanding leadership in the reduction crushing field. This is evidenced by their repeated use for metallic ore reduction. Built in Short Head and Standard models and in capacities up to 900 tons per hour, there is a type and size for every crushing need. When your operations involve fine crushing, follow the leaders in the metal mining industry who are doing their reduction crushing with Symons Cones.

- BISMUTH
- CADMIUM
- CHROMIUM
- COPPER
- GOLD
- IRIDIUM
- IRON
- LEAD
- MAGNESIUM
- MANGANESE
- MERCURY
- MOLYBDENUM
- NICKEL
- PLATINUM
- RADIUM
- SILVER
- TITANIUM
- TIN
- TUNGSTEN
- URANIUM
- VANADIUM
- ZINC

NORDBERG MFG. CO.
MILWAUKEE 7, WISCONSIN
NEW YORK • SAN FRANCISCO • WASHINGTON • SPOKANE
MEXICO, D. F. • LONDON • TORONTO • JOHANNESBURG

NORDBERG
Machinery for processing ores and industrial minerals

Primary Crushers

Vibrating Bar Grizzly

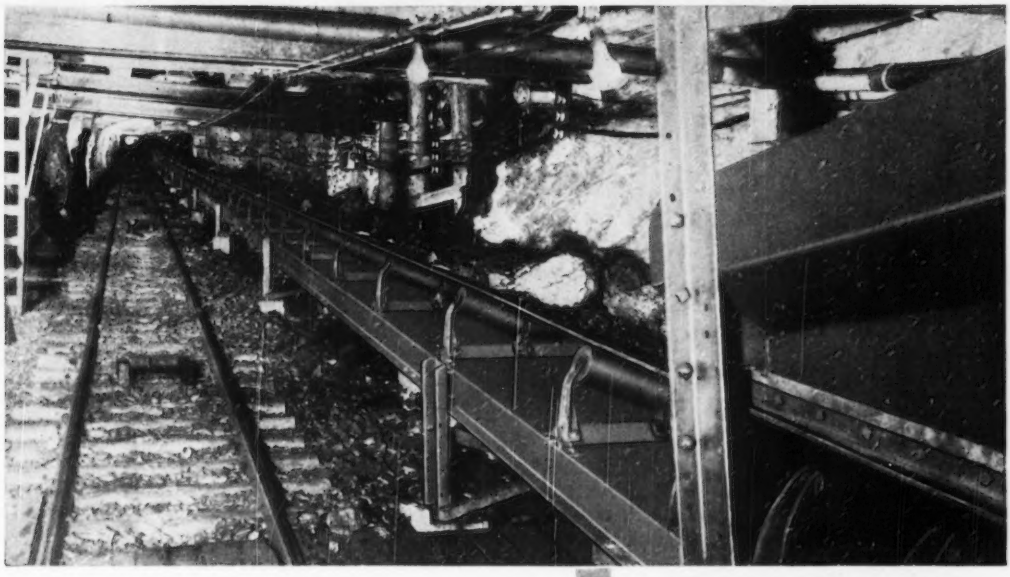
Symons Rod Deck Screen

Grinding Mills

Mine Hoist

Diesel Engines

12,500,000 TONS HANDLED...



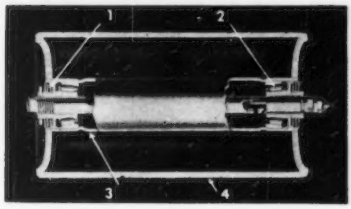
was just a start for Rex Idlers

You'd think that carrying 12,500,000 tons of material would be a lifetime job for any belt conveyor idlers. After these rugged Rex Idlers handled that amount of aggregate for the Shasta Dam as a starter, the same idlers were installed on the longest, highest belt slope conveyor in regular service. And they're still going strong.

That's real proof that Rex Belt Conveyor Idlers give you lowest cost service . . . that they eliminate costly down time caused by premature idler failures. Not only do Rex Idlers last longer, they also are easy on the belt. They eliminate destructive belt pinching and creasing, and absorb practically no power. Special application idlers, such as Rex Impact Cushioning Idlers illustrated above (lower right hand corner), installed under loading points, protect belt from laceration and carcass failures.

For the complete story on these cost-cutting idlers, mail the coupon for your copy of Bulletin No. 463R.

These Rex Quality Features Add Life to Your Conveyors



1 Triple labyrinth grease seal . . . dust stays out, grease stays in.

2 Tapered roller bearings, deadshaft type mounting, oversize capacity.

3 Unit mounting for bearings for positive alignment and minimum friction.

4 Heavy duty one-piece welded steel construction for maximum roll life.

CHAIN BELT COMPANY
1679 West Bruce Street
Milwaukee 4, Wis.

Gentlemen:
☐ Send me my copy of Bulletin No. 463R.
☐ I would like to see a Rex Field Sales Engineer.

Name.....

Company.....*Dept.*.....

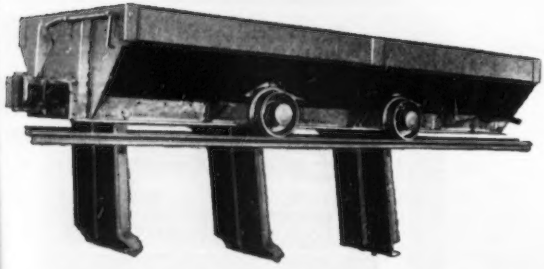
Address.....

City.....*State*.....

REX CHAIN BELT COMPANY — BELT CONVEYOR IDLERS

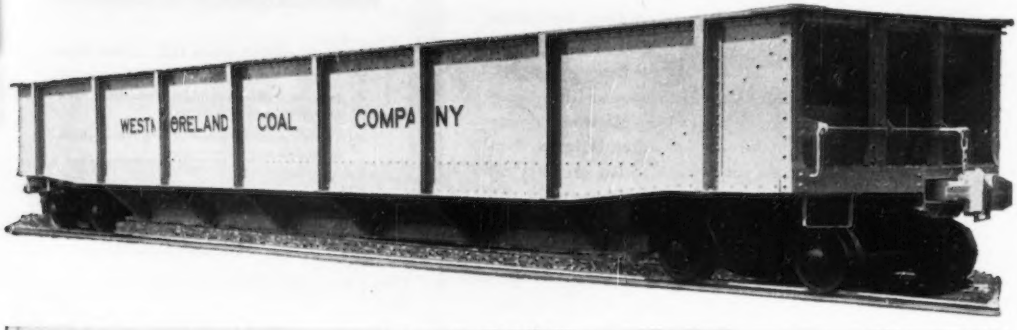
"WE SET

1950 Metal Mining Convention and Exposition Salt Lake City



At the new Saginaw Mine, operated by Oglebay Norton & Company, the drop-bottom mine cars are equipped with Willison Automatic Couplers, NACO steel wheels and integral draft rigging. Cars were built by Watt Car & Wheel Company.

The Hampton Mine of Westmoreland Coal Company employs 30-ton, drop-bottom cars, built by American Car & Foundry Company. These cars are equipped with Willison Automatic Couplers, NATIONAL Cast Steel Yokes and long-travel, high-capacity NATIONAL Rubber-Cushioned Draft Gears.



NATIONAL MALLEABLE AND
WILLISON AUTOMATIC COUPLERS • NACO STEEL WHEELS • NACO

NEW RECORDS

for safety...speed...lower costs...with

WILLISON *automatic* COUPLERS"

That's the proven experience of operators who utilize mine and industrial cars equipped with Willison Automatic Couplers. From the first such car in 1927 to the most recent installation, Willison Automatic Couplers pay their way in safety, speed and cost reduction. Five important reasons account for this long record of performance:

1. MAXIMUM SAFETY—No manual assistance is needed for coupling, nor need workmen go between the cars for uncoupling.

2. FASTER HANDLING—Cars couple instantly on contact and can be uncoupled almost as quickly. Because Willison Automatic Couplers have wide gathering range and identical contours, no equipment needs to be reversed. No "one-way streets" for Willison-equipped cars.

3. HIGHER SPEED HAULAGE—Because Willison Automatic Couplers eliminate damaging slack, they permit higher speeds with maximum stability, and more protection for rolling stock. This smoother operation reduces surging, spilling and danger of derailment. Consequently, these cars make more trips and handle more tons per day.

4. LOW MAINTENANCE COST—Two sturdy parts do all the work—the head and the lock. No pivoted hooks or knuckles—the coupler body takes the stresses without the interposition of a single movable part. Result—less wear and tear on both coupler and cars. This means reduced repair expense, less time out of service.

5. VERSATILITY—Willison Automatic Couplers are being used on almost every size and type of mine and industrial cars in wide varieties of applications.

These advantages of Willison Automatic Couplers have been proved for twenty-three years by leading operators of mine and industrial equipment. To get increased safety, more output per man per day per car, at lower cost, specify Willison Automatic Couplers for new cars or those you are rebuilding.

Write for circulars No. 1746 and No. 5240

NATIONAL MALLEABLE AND STEEL CASTINGS COMPANY
CLEVELAND 6, OHIO

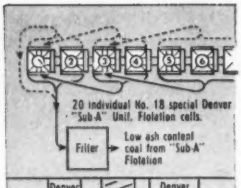
NATIONAL *Products*
FOR TRANSPORTATION AND INDUSTRY

STEEL CASTINGS CO.
STEEL LINKS AND SWIVEL HITCHINGS

FOR COMPLETELY FLEXIBLE FLOTATION RESULTS USE THE

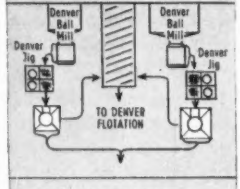
DENVER "SUB-A" UNIT FLOTATION CELL

Roddymoor* Coal Flotation England



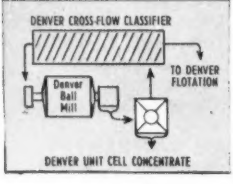
Extreme flexibility is provided by using Denver "Sub-A" Unit Flotation Cells. Mr. H. Nelson of England's National Coal Board, says, " . . . *Denver Flotation Cells have proved ideal for our purpose; being flexible enough to allow almost any combination of flows, and extremely low in maintenance costs.*"

Coarse Gold From Grinding Circuit



Free gold and gold associated with chalcopyrite, are much easier to float in a dense pulp, easily maintained in a Denver Unit Flotation Cell. Such high densities in subsequent flotation circuits cannot be satisfactorily handled, thus making even more desirable the recovery of coarse values in the grinding circuit.

Slime Loss Reduced in Copper Plant



Decreasing slime loss in copper circuit is the function of this Denver "Sub-A" Unit Cell. Recovery of copper at a coarse size eliminates overgrinding and resulting slime losses. Combined concentrate of Unit Cell and subsequent "Sub-A" Flotation gives higher average grade as well as higher total recovery.

**Read this complete story in May-June, 1950, Deco Trefoil.*

DENVER EQUIPMENT 24 HOUR SERVICE COMPANY

FLOTATION ENGINEERS

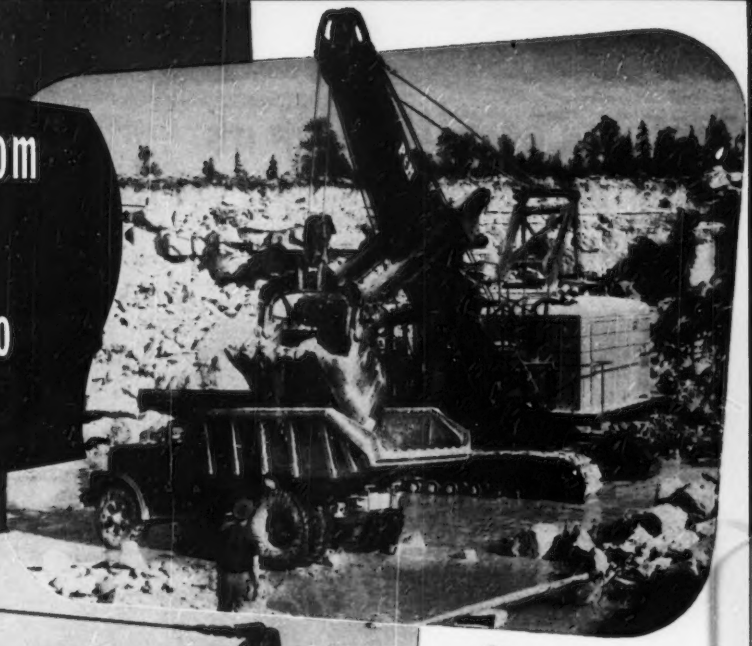
All your process equipment needs . . . from *Testing to Feeder to Dryer* . . . are available. Write, wire or phone for complete information.

"The firm that makes its friends happier, healthier and wealthier"

DENVER • NEW YORK • CHICAGO • EL PASO • VANCOUVER • TORONTO • MEXICO, D.F. • LONDON • JOHANNESBURG • RICHMOND

DENVER EQUIPMENT COMPANY, 1402 17th St., Denver 17, Colorado

For Rock Bottom Costs From Start to Finish!



START . . . FLUXING STONE
A P&H Model 1400 Diesel-Electric (4 yd.) shovel, owned by Drummond Dolomite Inc. at Drummond Island, Michigan.

FINISH . . . BLAST FURNACE SLAG
A P&H Model 1400 Diesel-Electric shovel owned by the Buffalo Slag Co., Buffalo, New York.

Visit P&H Exhibit

Booth #513

American Metal Mining Congress
Salt Lake City
August 28-31

P&H DIESEL-ELECTRIC SHOVELS

with *MAGNETORQUE** HOIST DRIVE

Now, you can have electric shovel efficiency *anywhere* with a P&H Diesel-Electric quarry and mining shovel. It's a complete electric shovel . . . with the addition of a diesel engine to furnish power . . . entirely independent of high line service.

Years of the toughest rock digging have proved the P&H Diesel-Electric from every standpoint . . . dependable operation . . . less maintenance . . . rock bottom tonnage costs.

This simplified P&H Diesel-Electric shovel is made possible by the exclusive P&H Magnetorque Hoist Drive. Hoist generator, hoist motor, slip friction clutch and other mechanical devices are completely eliminated. Magnetorque is only one of many P&H Added Values. Ask for Bulletin X83-DE.

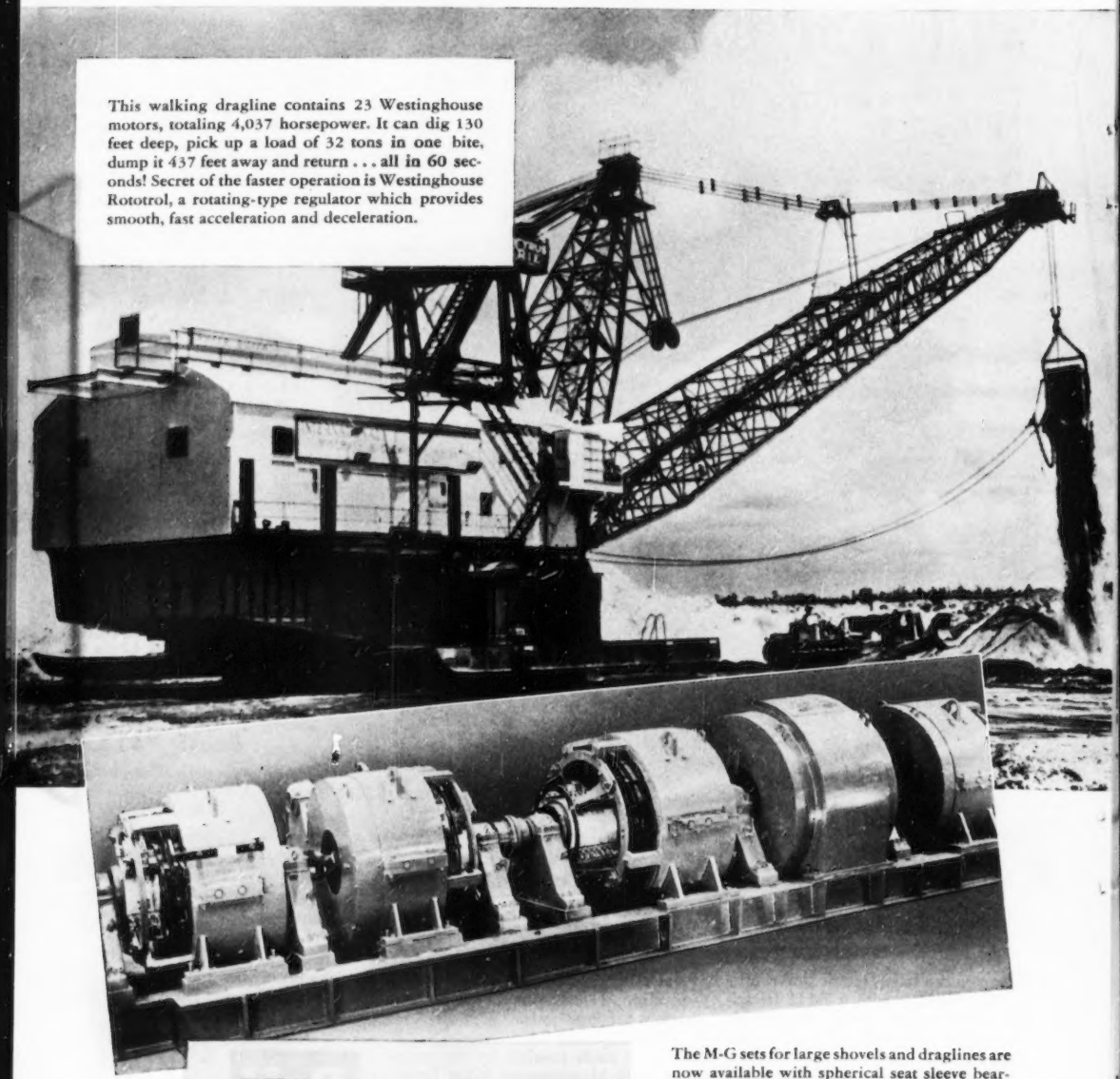
Every Third P&H Electric Shovel Sold is a Repeat Order.

P&H ELECTRIC SHOVELS
4454 West National Avenue
Milwaukee 14, Wis.

HARNISCHFEGER CORPORATION

*Trade-Mark of Harnischfeger Corporation for electro-magnetic type clutch

YOU CAN BE SURE.. IF IT'S Westinghouse



This walking dragline contains 23 Westinghouse motors, totaling 4,037 horsepower. It can dig 130 feet deep, pick up a load of 32 tons in one bite, dump it 437 feet away and return . . . all in 60 seconds! Secret of the faster operation is Westinghouse Rototrol, a rotating-type regulator which provides smooth, fast acceleration and deceleration.

The M-G sets for large shovels and draglines are now available with spherical seat sleeve bearings. This new development compensates for misalignment and provides adequate lubrication even under severe operating conditions and tilts up to 15°.

Westinghouse

EQUIPMENT FOR THE MINING INDUSTRY

Westinghouse-equipped draglines and shovels

Some two-thirds of all large draglines in use in this country are Westinghouse equipped. Many of these are in use by operators who have again and again specified Westinghouse equipment.

For instance, one northern Illinois coal company and an associated company have purchased a total of four large draglines in the past few years. Each time Westinghouse equipment was specified. Another case is a Pennsylvania coal operator who has purchased three such draglines on all of which Westinghouse equipment was specified.

There must be reasons why Westinghouse equipment is so well liked by operators who have tried it. Here are a few of them—

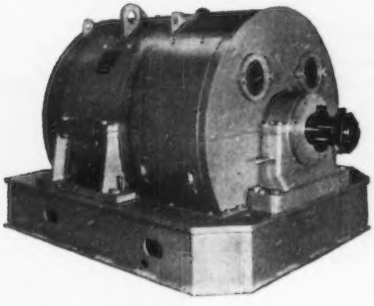
Smooth operation is brought about by Rototrol. This rotating regulator developed by Westinghouse makes possible speed changes with less strain, resulting in less maintenance and smoother operating characteristics throughout.

Fast operation comes from the higher bucket-lowering speeds of the large Westinghouse drive motors. It comes, too, from the fast swing cycle and accurate spotting of bite and drop that Rototrol makes possible.

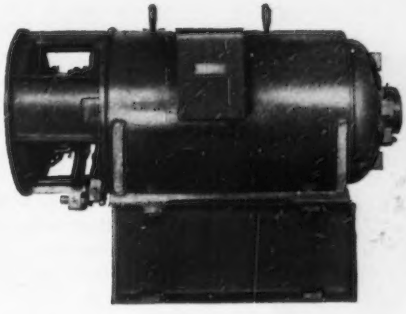
Reliable operation of Westinghouse equipment reduces down time. For example, Rototrol is the simplest of all rotating controls, both as to apparatus and circuits. The large M-G sets are equipped with spherical seat sleeve bearings designed to permit continuous operation even at tilts of up to 15°. Many of the small motors have sealed, pre-lubricated bearings that require no lubrication, and that have a *proved* record of lower maintenance.

This co-ordinated equipment for shovels and draglines is a product of the more than half a century during which Westinghouse engineers have worked with the Mining Industry. If you are interested in handling more tons per man hour, let our Mining Industry Specialists help you work out the answers. Call your nearest Westinghouse Office, or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-94809

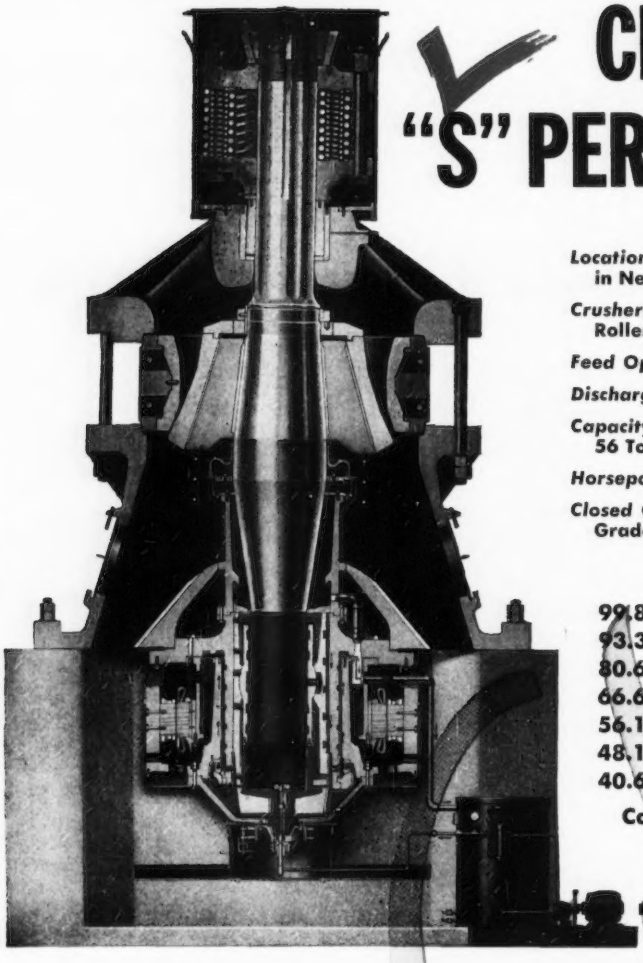


In large drive motors such as this, the use of poleface compensated winding makes possible a smaller armature diameter and a lower WR^2. This feature is available both on the 425-hp motor and the 600-hp motor now being offered for use on shovels and draglines.



This is the Rototrol unit that has revolutionized performance of shovels and draglines. By eliminating the sharp changes and attendant strains of Magnetic Control previously used, Rototrol speeds operation and reduces maintenance costs.

CHECK TYPE "S" PERFORMANCE



Location: Nationally known Mining Co. in New York State

Crushers: Four No. 37½ Kennedy type "S" Roller Bearing Gyratory Crushers

Feed Opening: 6¼"; *Diameter of Head:* 3 Feet

Discharge Setting: 7/32" Closed Side at Head

Capacity Each Crusher: 56 Tons Per Hour

Horsepower Each Crusher: 48 HP.

Closed Circuit Operation: Gradation As Follows:

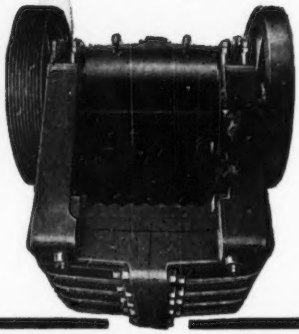
CHECK THE FIGURES!

99.8%	Minus	3	MESH
93.3	"	4	"
80.6	"	6	"
66.6	"	8	"
56.1	"	10	"
48.1	"	14	"
40.6	"	20	"

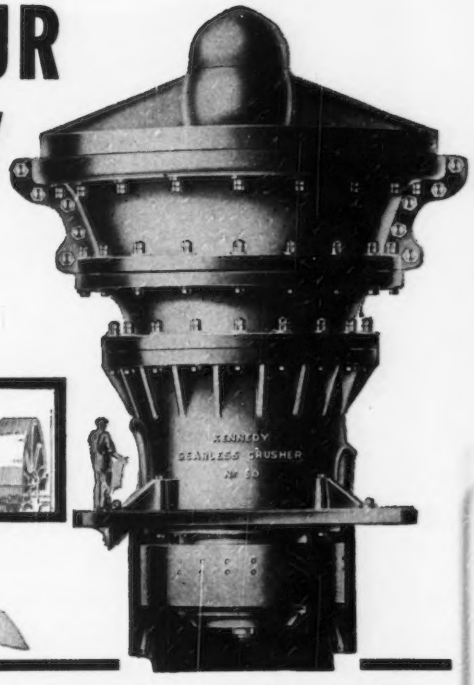
Can You Equal These Figures?

CHECK SWING JAW CONSTRUCTION

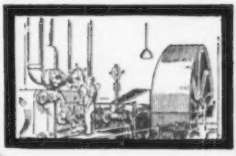
We checked POWER-LOSS in the "KVS" Swing Jaw Crusher. How? By making the STATIONARY jaw carry 50% of the crushing load, instead of leaving it all to the SWING jaw. Result—you SAVE POWER in crushing. Another thing we checked is PARTS TROUBLE, by making the swing jaw ALL IN ONE PIECE, except for the crushing plate. And we made that removable. Note also —Swing and Stationary jaws are INTERCHANGEABLE, and reversible end for end. This means DOUBLE jaw-crushing life. CHECK!



✓ CHECK YOUR KINETIC ENERGY

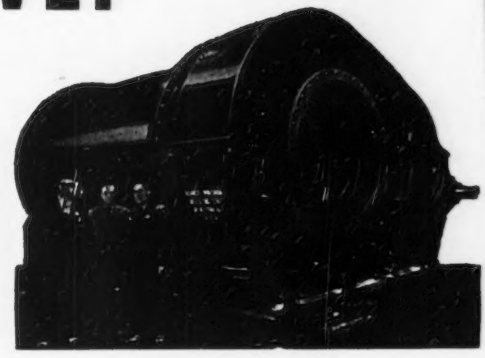


Ever check an old Corliss Engine and see how the big whirling flywheel or pulley developed KINETIC ENERGY (or, in simple words, added FREE power)? There's a BIG Pulley in the "KVS" Gearless, too! It revolves at a speed of 3,500 ft. per minute — that's what creates the EXTRA crushing power you get for nothing! What's more, the 11 ton pulley (used in a "KVS" Gearless Crusher weighing 400,000 lbs.) turns so easily you can turn it with TWO FINGERS! In short, more CRUSHING for LESS POWER COST (with much less vibration and much less NOISE), is the idea that put the "KVS" Gearless way out in front and keeps it there! And there are many other features . . . Check!



✓ CHECK THE FAT CHECK YOU WILL SAVE!

How'd you like to tear up your check for, say, $6,000 that you thought you'd have to spend on a 10 ft. tube or ball mill? Well — you can do just that if it is a "KVS" Mill with integral gear drive. With this drive, you can use a SYNCHRONOUS MOTOR, at a TREMENDOUS saving! Why? Because motor is DIRECT CONNECTED to driving shaft. Shaft is carried in roller bearings that CANNOT be misaligned or set wrong. The pinion shaft to which the motor is connected runs at approximately 600 r.p.m. while pinion shafts in other mills run at about 180 r.p.m. Another thing . . . "KVS" trunnions on large sized tube and ball mills are CARRIED ON OIL. Bearing never wears out, uses little power. All gears and bearings automatically sprayed with oil before tube mill is started (Design patented). In 15 years no "KVS" gears or pinions have worn out on this type mill. Check!



There are "KVS" BULLETINS covering all the above. Write for them today.

Kennedy-Van Saun
MANUFACTURING AND ENGINEERING CORPORATION
2 PARK AVE., NEW YORK 16, N. Y.
FACTORIES:
DANVILLE, PA., U. S. A.
CANADA, ENGLAND, FRANCE, AUSTRALIA

Switch to this new

PLASTIC Reinforced

PRIMACORD

in place of Wire Countered.

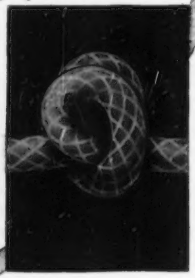
Field tested for over a year — where the going is toughest — the new PLASTIC Reinforced Primacord showed itself far superior to Wire Countered Primacord. Yet it costs no more!

Reinforced with rayon yarn, it is stronger and lighter in weight. Finished with a smooth, tough seamless plastic covering, it is waterproof and resistant to acids encountered in mineral ores. It does not become brittle or crack in cold weather, nor is it affected on hot summer days, and it is not a conductor of electricity.

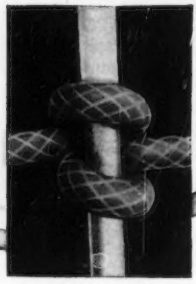
PLASTIC-Reinforced Primacord is your best bet in all deep, wet holes—in preloading, pipe line river crossings, horizontal holes, marine work, coyote tunnels and sleeper shots for seismograph work.

Plastic Reinforced Primacord is recommended for "down" lines where you formerly used Wire Countered Primacord.

1. To make the most effective hookup, use a simple clove hitch in the *ground* line, as shown in these three photographs.



2. The twin loops have been folded over to form a hole.

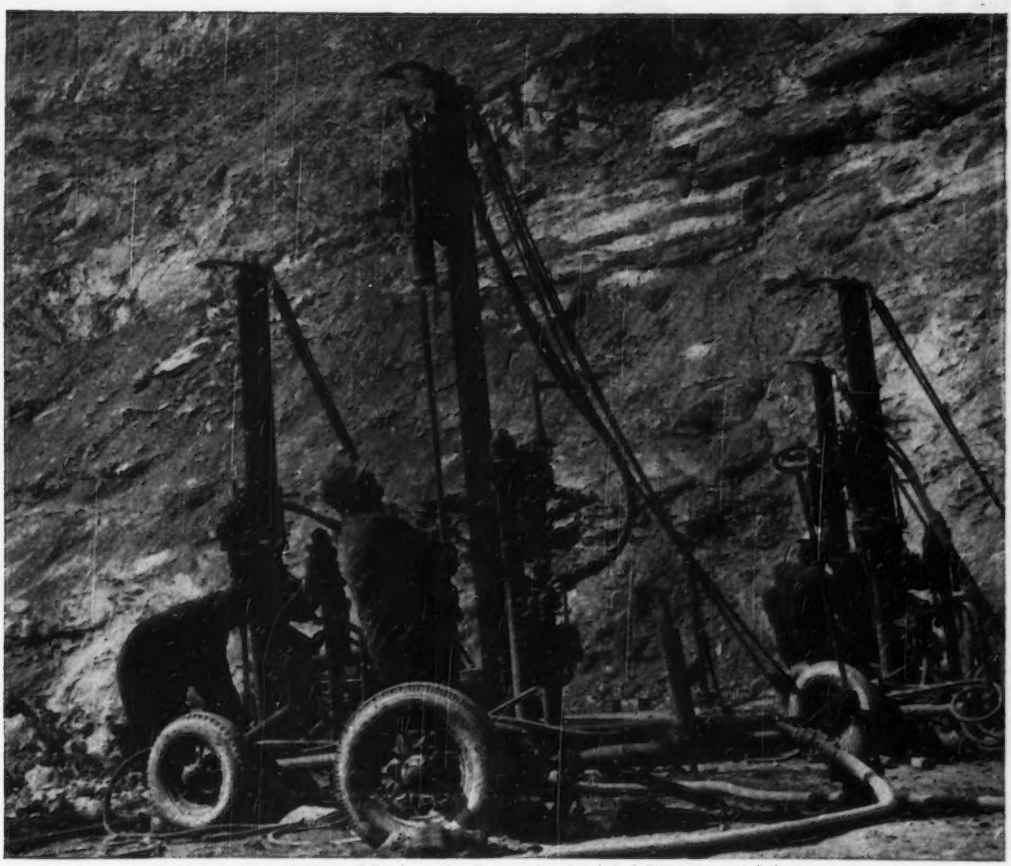


3. Pass the Plastic Reinforced Primacord through this hole and draw the knot up *tight*.

P-1

THE ENSIGN | BICKFORD COMPANY • SIMSBURY, CONN.

PRIMACORD-BICKFORD DETONATING FUSE • SAFETY FUSE SINCE 1836



In this open-pit mine Bethlehem Hollow has made a fine record on deep-hole drilling over a period of many years.

★ Ideal for either forged or detachable bits
★ Smooth center hole minimizes fatigue failure
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More than 2,000 sledge-hammer blows every minute

That's a lot of pounding for a drill steel to take—hour after hour, shift after shift. It's a reminder that reliable drill steel goes a long way towards keeping your drills running at maximum capacity.

Experienced hard-rock men appreciate the importance of good drill steel. Probably that's why so many of them stick to Bethlehem Hollow, whether the job calls for forged or detachable bits.

Ask for it by name: Bethlehem Hollow. That's making sure you'll have a drill steel engineered for the faster, harder blows of modern rock drills. Prompt delivery of standard sections and lengths from our mill or your nearest supplier.

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On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM HOLLOW DRILL STEEL

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It's our business to cut exploration time—deliver reliable map facts to you swiftly... economically.

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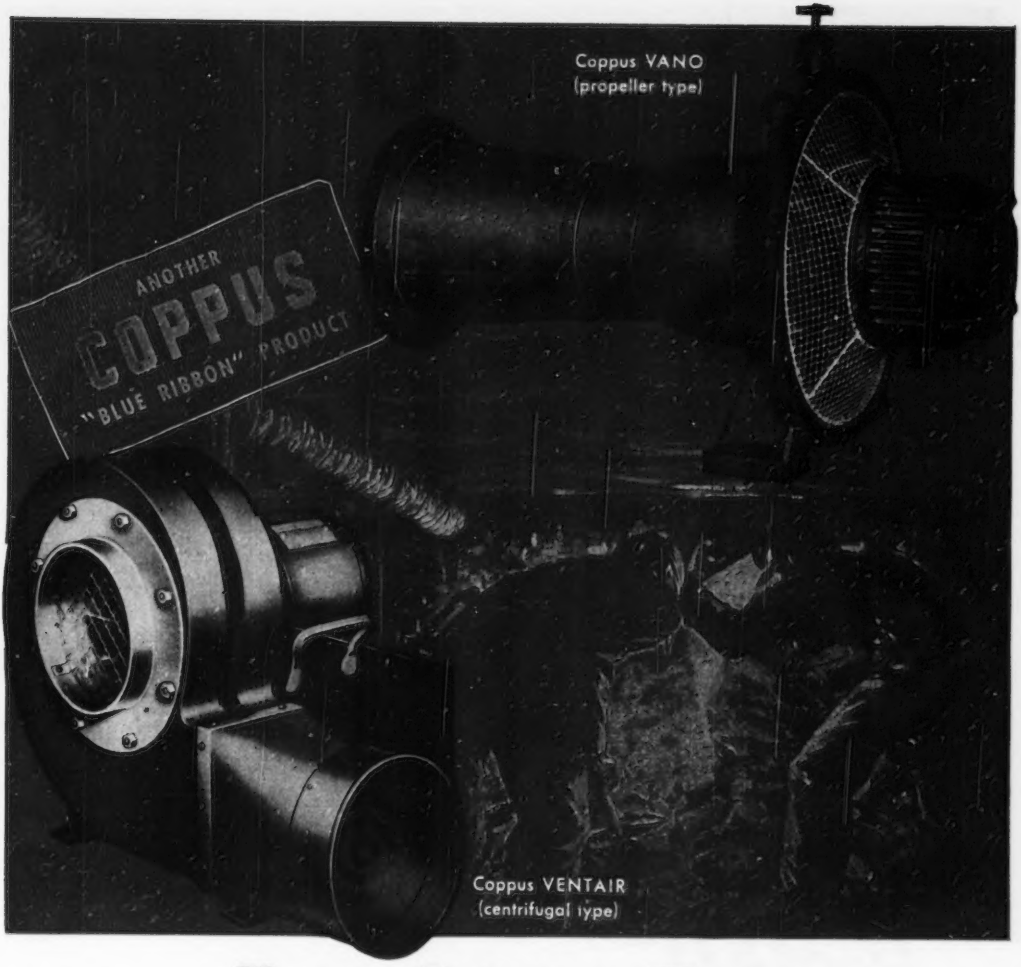

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Coppus Blowers are designed for two different types of mine ventilation requirements: the centrifugal Coppus VENTAIR is for long pipe lines; the propeller-type Coppus VANO for shorter lines . . . the correct selection will give you from ½ more to twice as much air — for a given power consumption — than an ordinary all-purpose fan.

Available for either compressed air or electric motor drive, both can be used as blowers or exhausters and are obtainable in capacities up to 90,000 CFM.

Only Coppus makes both these types, one of which will give you better, more economical mine ventilation . . . know them by the "Blue Ribbon" that symbolizes the engineering and production skill behind every Coppus product.

Representatives listed in MINING CATALOGS. Other Coppus "Blue Ribbon" products: steam turbines, gas burners, heat killers, air filters, blowers and exhausters for special purposes. See also THOMAS' REGISTER . . . Coppus Engineering Corporation, Worcester 2, Massachusetts.

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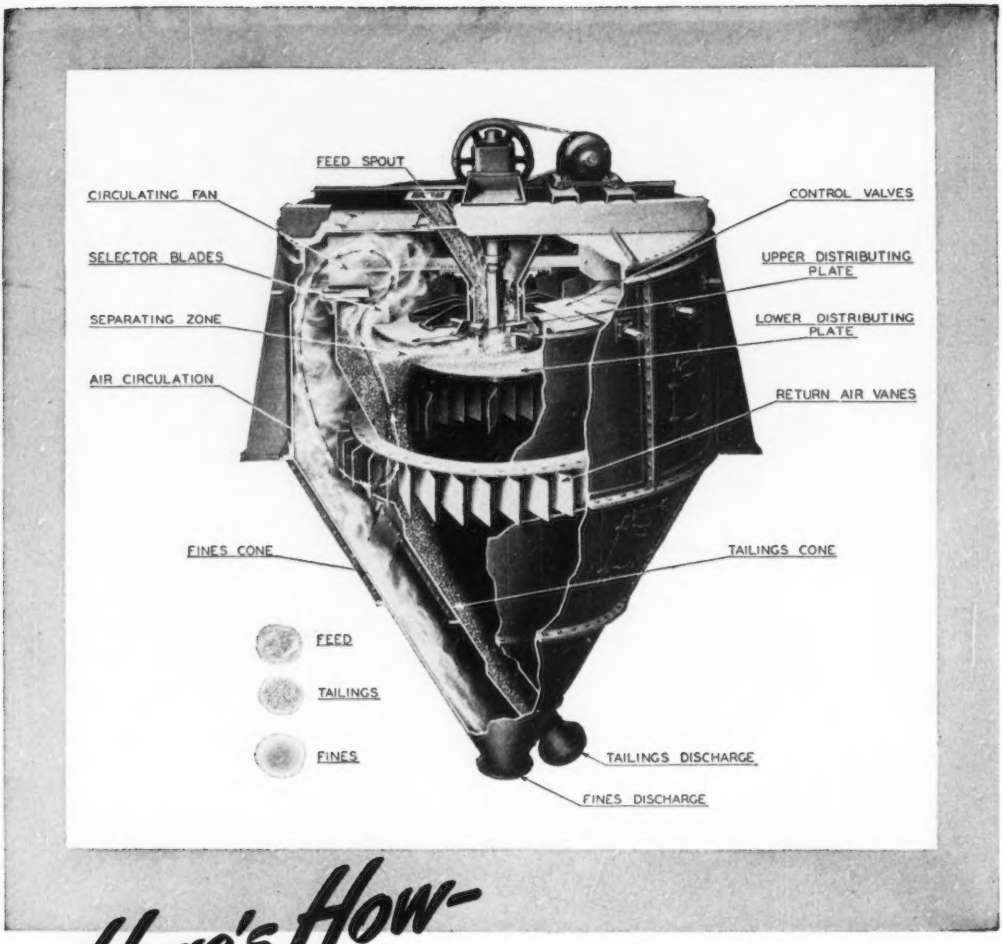

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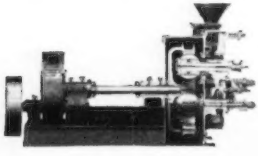
Produce accurate fines with increased output up to 300%

Exact regulation and control of centrifugal forces and air currents, one counteracting and overbalancing the other so precisely that by simple adjustments a product of almost any desired fineness is selected and collected, while coarser sizes are rejected . . . that's the principle of operation of Sturtevant Air Separators.

The benefits you derive from this separator are—increased output by as much as 25% to 300% . . . lower power costs by 10% to 50% . . . reduced maintenance.

A typical on-the-job example is as follows—a 16 ft. separator takes a feed of 750 tons per hour containing only a small percentage of the desired product and delivers 30 tons of material 90%, minus 200 mesh.

Investigate Sturtevant Air Separators today. Write for information and bulletin.



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Capacities from 12 to 18 tons per hour. Range 10 to 200 mesh. Use this mill in closed circuit with Sturtevant Air Separators.

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What do these profitable dust recovery systems have in common? Just one thing... each was custom-engineered, designed and produced by Buell... These profit-producers are cyclone-type systems, with the patented van Tongeren 'Shave-Off'. And now, operating on the exclusive StediFlow dust-fall principle, Buell's new 'SF' Electric Precipitator stands ready to recover still finer dusts and fumes!

Perhaps Buell can help you, too, to turn dust-waste into profits. For more information, write for our new book on recovering valuable dust. Buell Engineering Company, 70 Pine Street, Suite 5035 New York 5, N. Y.

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Engineered Efficiency in **Dust Recovery**

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Other power transmission units from the broad Link-Belt line on display, will include ball and roller bearing pillow blocks and the various chains popular in the metal mining industry.

Link-Belt representatives, each an experienced specialist in his field, will be present to consult with visitors. The entire exhibit has been designed to give you valuable knowledge and expert advice relating to the efficient use of modern Link-Belt power transmission, conveying and processing equipment.

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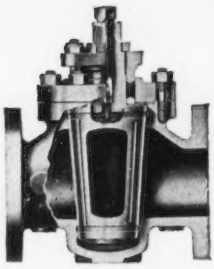
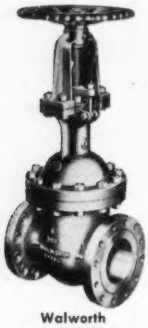


Walworth
Lubricated Plug Valve



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Your Walworth distributor will give you full information on the *complete line* of Walworth steel, iron, and bronze, and special alloy valves and pipe fittings; also Walworth Lubricated Plug Valves, and Walseal* valves, fittings and flanges. Ask for this information today.

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● Many of our customers think of United States Steel Supply as the "department store" of the steel industry. That's exactly what we aim to be . . . a source of supply that always has a large diversified stock of steel, aluminum, tools, equipment and machinery on hand so that customers' orders can be filled promptly. Customers who shop around come to us with comments like these: "Only place we could find what we wanted." "We were hunting an odd size . . . *you had it!*" "U. S. Steel Supply was the only concern with all the stock we needed."

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UNITED STATES STEEL

HEAVIER LOADING is possible on conveyor belts built with "Cordura" Rayon. This yarn is stronger than natural fibers commonly used. It packs extra strength into conveyor belts and enables them to carry loads to the capacity of power equipment.

WHY YOUR NEXT CONVEYOR BELT SHOULD BE BUILT ON DU PONT "CORDURA" RAYON

The next time you need a conveyor belt, ask your supplier about the remarkable performance of belts built on Du Pont Cordura* High Tenacity Rayon. This industrial rayon provides far greater strength than natural fibers commonly used, and makes a thinner, more workable belt, *at no extra cost.*

This yarn, which puts toughness in heavy-duty truck tires and makes thinner, stronger hoses, can also make more efficient conveyor belts for your mine.

We'll be glad to furnish the names of suppliers of belts made with "Cordura." You can get full information about "Cordura" in the new manual, "Sinews for Industry." It gives physical properties of "Cordura" rayon, describes many successful applications and tells how "Cordura" improves the efficiency of conveyor systems. For your free copy, address Room 4529, Rayon Division, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

*Reg. U. S. Pat. Off.

DU PONT "CORDURA" HIGH TENACITY RAYON

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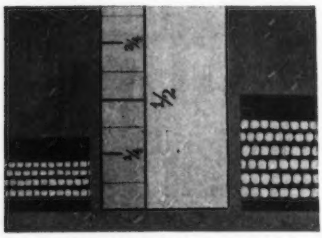
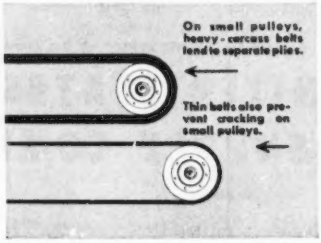
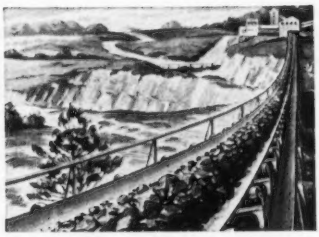
for RAYON . . . for NYLON . . . for fibers to come look to DU PONT



GREATER STRENGTH of belts built with "Cordura" is illustrated above. At left is cross-section of four-ply belt sinewed with "Cordura." It's stronger than conventional 6-ply belt at right, yet only half as thick. This thin, light belt is particularly desirable where panel equipment is moved frequently.



MORE FLEXIBLE. Belts built with "Cordura" have less tendency to crack and separate plies when run over small pulleys required in confined working space. And belts built with "Cordura" have less stretch, so less take-up room is needed. And they trough well under any loading conditions.



LONGER LIFTS. The high tensile strength of "Cordura" Rayon eliminates costly transfer points. For example, a belt reinforced with seven plies of "Cordura" can lift 1000 pounds of overburden per hour up a 15° slope over 1000 foot centers. It has design tension of 900 pounds per inch of width.

Twin 500-barrel Hiboy Bolted Steel Tanks with Safwalk Walkway

ECONOMICAL STORAGE *for Your Liquids*

• On-the-site storage of liquids is no longer a problem. BS&B Tanks can go wherever you can go. Bolted Steel or Durable Wood, when knocked down, is only a truck load. Many times they have been flown in to a new operation.

And there is much more to recommend BS&B Tanks in addition to portability. They have proved their ability in containing all types of materials. Bolted Steel are ideal for oils, water, even aviation gasoline. BS&B wood tanks are employed the world 'round for water, brines corrosive fluids and settling systems.

They're soundly engineered for long, long life. Weatherproof and tight as a bottle. Even inexperienced labor can erect them quickly. Many sizes available from stock. EXPORT SHIPMENTS A SPECIALTY.

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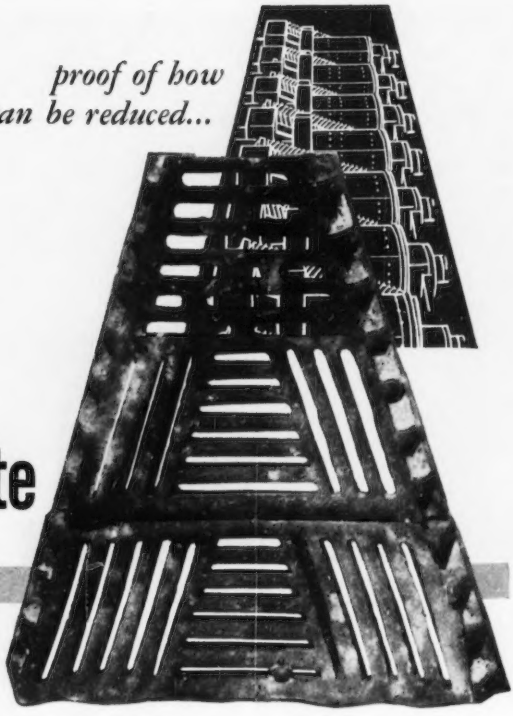
proof of how milling costs can be reduced...

this AMSCO® Grate has milled 193,797 tons



An actual example of how AMSCO Grates last longer, reduce shutdowns and increase milling profits.

Equally Big Savings On Liners, Too! Recent production figures on Amsco double-wave Liners in a mill grinding copper ore: 667,308 tons ground . . . at a liner cost of about a half-cent per ton! *It will pay you to investigate the long, low-cost service of Amsco Liners!*

Find out more about Amsco Liners and Grates

Be sure to ask for a copy of Bulletin 449-ML. Describes the characteristics of Amsco ball mill alloys; gives additional facts on dollar-saving installations. Free copy on request.

Here's an actual photograph that proves an important, profit-building point to users of ball mill equipment . . . *the real cost of liners and grates is the actual service cost.*

This Amsco grate has milled 193,797 tons . . . compared with just 113,000 tons for a previously used hardened steel grate which ran under identical conditions. And, during this period of 72% greater tonnage milled, *the Amsco grate required no down-time for repair.* The previously used grate started to crack at 50,000 tons—required many shutdowns for plugging holes.

Because of heavy impact, this particular Amsco Grate was made of austenitic chromium-manganese steel—one of three Amsco alloys developed for specific conditions of impact and/or abrasion. These Amsco liner and grate alloys can result in big savings on milling costs. Amsco Engineers are fully qualified to make alloy recommendations based on your operating conditions—*write today for the name of the Amsco engineer nearest you.*

AMERICAN Brake Shoe COMPANY

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Look at the difference in fragmentation

when Du Pont "MS" Caps are used...

Blasting with cap and fuse in the mine of the Sidney Mining Company at Kellogg, Idaho, gave results as shown in the photograph at the left, above. Large slabs and coarse pieces of ore required extensive hand labor and bulldozing before ore could be moved to chutes.

Then it was decided to use Du Pont "MS" Delay Electric Blasting Caps.

Now ore breaks well. (See photo at right, above.) No secondary blasting is necessary, and the slusher handles ore easily. Other advantages of using Du Pont "MS" Delay Electric Blasting Caps are reduced vibration and concussion, less timber damage, elimination of dynamite from the muck pile and the absence of bootlegs.

Why not do as many experienced mine operators have done—switch to efficient Du Pont "MS" Delay Electric Blasting Caps? Any Du Pont Explosives representative will be glad to give you complete information about "MS" (Millisecond) Delay Electric Blasting Caps. He'll also work out a trial blasting plan for any problem you may have. E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Delaware.

ASK ABOUT "MS" CAPS AT THE DU PONT EXHIBIT

Booth 213-215, at the Metal Mining Convention and Exposition of The American Mining Congress, meeting in Salt Lake City, Utah, August 28 to September 1, 1950.

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Blasting Supplies and Accessories

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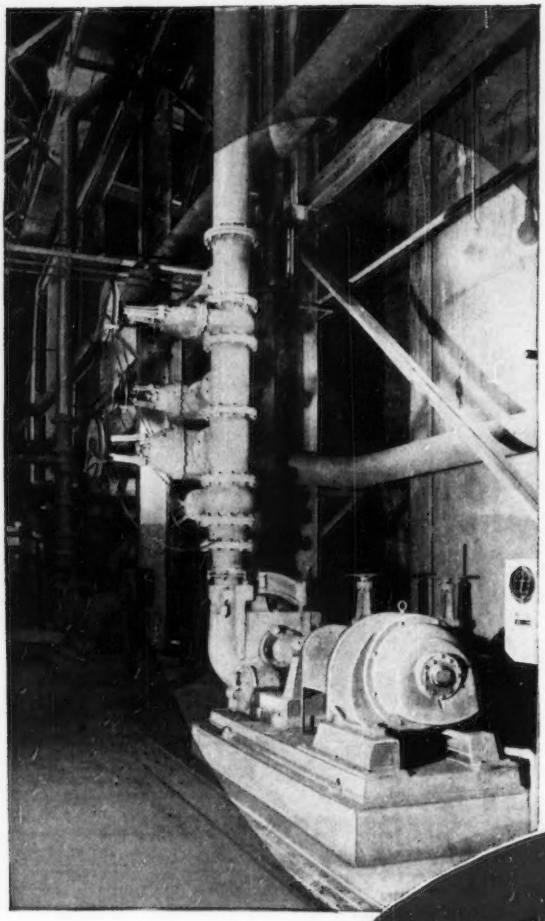
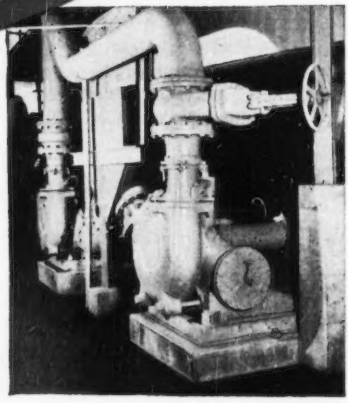


Companion to the famous WILFLEY Acid Pump

cement slurry

In every plant where slurries, sands or slimes must be handled on a cost-reducing basis, WILFLEY sand pumps can meet every requirement with a comfortable margin of reserve capacity. These famous pumps deliver continuous, trouble-free performance without attention ...stepped-up production...actual dollar-savings in power and operation. There is an economical WILFLEY pump size for every pumping problem. Individual engineering on every application. Write or wire for complete details.

WILFLEY centrifugal PUMPS



At one of America's foremost cement plants, the 8 inch WILFLEY Slurry Pumps (illustrated) deliver cement slurry continuously at maximum pumpable density, with substantial power savings and minimum replacement of wear parts.

Buy Wilfley for Cost-Saving Performance

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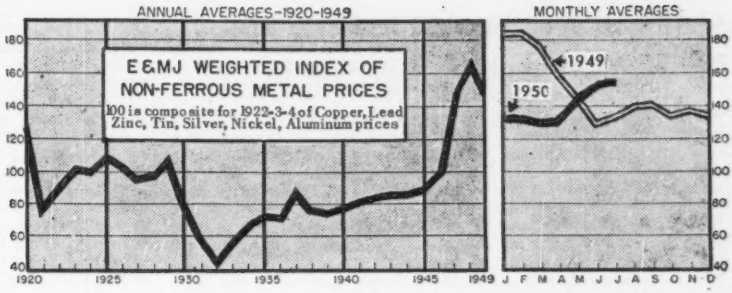
E&MJ OUTLOOK

PRICES



MARKETS

With general industrial activity nearing 200% of the 1935-39 Federal Reserve index average, demand for major non-ferrous metals showed no sign of moderating. In fact, it was only restraint on the part of metal producers that kept metal prices from getting completely out of hand. Consumers, nervous over the Korean situation, were ready and even eager to pay fancy prices for zinc and copper.

E&MJ's index of non-ferrous metal prices rose to 156.40 for July, against 154.30 for June. A rise in the monthly averages for copper, zinc, and tin was responsible. (See "Markets," next page.)

Lead, despite lack of interest from the stockpilers, made a complete turnabout from weakness to strength. Low consumer inventories were back of it. **Tin,** owing to war jitters, made the biggest rise of the month.

AT HOME

Even if Russia backed off and behaved from now on, which isn't likely, the U. S. has by now been startled into a preparedness drive that seems sure to keep the mining industry going full blast for at least the next couple of years. Here's how things looked as July ended:

Truman's Defense Production Act (the Omnibus Bill) called for controls through existing civilian agencies. No 1950-model WPB is in sight unless war begins. Steel, copper, zinc, and aluminum will be allocated by Commerce Department. If equipment runs short, mines needing it can get help from James Boyd, USBM's director. That's part of his job hereafter.

Mining subsidies look like a good bet, with Senator O'Mahoney backing a revival of his old bill, S. 2105. Its new number is S. 3972. In any case, mines will get loans under the Omnibus Bill's provisions, for increasing production only. It will probably be harder for a productive mine to avoid a Government loan than to get one, from here on.

Gold mines probably won't face another L-208. They will, however, have to fend for themselves on manpower and supplies.

The stockpile will step up purchases of copper, zinc and tin. No stockpiled metal will be released to industry, however, short of real war.

U. S. manganese mines and **taconite** treatment projects are back in line for special Government aid. Congress will probably authorize loans specifically for them, with manganese getting most attention.

ABROAD

Fighting in Korea halted the international trend of currency improvement that began early this year. People lost much of their growing faith in paper, and again eagerly sought gold. Hence, free markets in gold gained strength, with prices running around $40 per oz.

MARKETS—Trends and Prices

Threat of Allocation of Metals Stimulates Already Heavy Buying Movement—Lead Up—Tin Excited

WITH INDUSTRIAL ACTIVITY under tremendous pressure because of the easy credit policy of the Administration, additional stimulation arising from the Korean crisis forced consumers of metals to revise their estimates on the outlook for the second half of the year and prepare for added difficulties ahead. Consumers were in the market during July for even greater tonnages of copper, zinc and aluminum than current output could supply. Prices were kept in hand by the nature of the emergency. President Truman asked Congress for legislation that would give him authority to allocate critical materials, control commodity trading and regulate consumer credit.

The E&MJ index of non-ferrous metal prices advanced in July to 156.40, which compares with 154.30 in June and 136.65 in July a year ago. Higher monthly averages for copper, zinc and tin accounted for the rise.

The Federal Reserve Board's index of industrial activity rose to 199% of the 1935-39 average, a new high for the movement. The Board regards it as "imperative" that steps be taken to regulate consumer credit to lessen inflationary pressure.

Free Entry of Copper

Though it was apparent to most observers that the import duty on copper eventually would be suspended, the month passed without final action by Congress on this important matter. After the conclusion of hearings in Washington, at which representatives of the industry and Government officials presented their views, it became clear to most observers that heavy imports would be required to meet the demands of both consumers and the defense program. Estimates on import requirements varied between 300,000 and 400,000 tons a year. The House approved a bill to suspend the 2c. per pound duty until June 30, 1951. Owing to pressure of other important business growing out of the Korean situation, the Senate did not get around to acting on the measure up to the time that July ended. However, early action was expected to settle the tariff dispute. The legislation approved by the House provides for free entry of copper retroactive to July 1, 1950.

Delay in passing the bill prior to July 1, 1950, automatically restored the duty as of that date. Foreign copper purchased by domestic consumers for July delivery was obtained at the going market price, duty for account of the buyer. Pending final action on the duty by Congress the withdrawals of foreign copper for domestic consumption were light.

An event of importance to the copper industry was the announcement by Kennecott to the effect that it would sell its domestic production on a uniform delivered price basis throughout the country. The announcement follows:

"Kennecott Copper Corp. announced that, effective with sales made for delivery in the month of August, all sales of its domestically-produced copper for delivery in the United States will be made on a uniform delivered price basis. Thus, on the basis of the 22½c. price for electrolytic copper in standard shapes in carload lots, Kennecott will deliver its domestically-produced copper at that price f.o.b. railroad cars point of destination in the United States. Differentials for special shapes and other grades remain unchanged."

Garfield Refinery Starts

Other producers continued to sell copper in the Middle West and West at a differential over Connecticut of one-eighth cent per pound. It was generally maintained that when a competitive market returns the action by Kennecott will have to be followed by all sellers. The leading domestic producer's new refinery near Garfield, Utah, is now in production. Operating at capacity, the refinery will turn out 12,000 tons of copper a month.

Copper contained in products shipped by fabricators to their customers in June contained 132,558 tons of the metal, only 807 tons less than in the preceding month. Fabricators' stocks of refined copper at the end of June totaled 332,330 tons, against 338,504 tons a month previous.

Producers' deliveries of refined copper in June totaled 126,047 tons, against 113,837 tons in May. Producers' stocks at the end of June declined to 50,327 tons, against 51,020 tons at the end of May.

Lead Buying Heavy

Lead reversed itself completely. As the month opened the market was unsettled with plenty of lead in sight. On unfavorable news from Korea, consumers decided to build up their stocks. In the week ended July 12, sales reported to *E&MJ* totaled 19,492 tons, quite a change from the 2,594 tons sold in the preceding week. On July 12th the price rose one-half cent per pound to 11½c., New York. Demand at the higher price continued active and another one-half cent advance took place on the following day, establishing the quotation at 12c. In the week that ended July 19 the sales increased to 31,574 tons. Demand remained active up to the end of the month. The tension over the Far Eastern situation also resulted in smaller offerings of lead from abroad, as well as increased buying of the metal in foreign markets.

Zinc remained strong on the basis of 15c. per pound for Prime Western, East St. Louis. Consumer and stockpile demands absorbed all of the slab zinc that was available from foreign and domestic sources. The supply situation as July ended was extremely tight. Galvanizers have been consuming about 36,000 tons of zinc a month. Shipments of zinc-base die castings in May contained more than 23,000 tons of zinc. Total industry shipments in June came to 90,920 tons, of which 68,214 tons was con-

Average Prices for July (E&MJ Quotations)

Copper:	
Electrolytic, Domestic, Refinery	22.200
Electrolytic, Export, Refinery	22.425
Lead:	
Common, New York	11.660
Common, St. Louis	11.460
Silver and Sterling Exchange:	
Silver, New York, per oz.	72.750
Silver, London, pence per oz.	63.500
Sterling Exchange, "Checks"	280.000
Zinc:	
Prime Western, East St. Louis	15.000
Tin:	
New York Straits	89.715
New York, 99% min.(e)	88.715
Gold, per oz. U.S. price	$35.000
Quicksilver, per flask	$73.440
Antimony, (E&MJ) (d)	27.780
Antimony, bulk, Laredo	24.500
Antimony, in cases, Laredo	25.000
Platinum, refined, per oz.	$72.080
Cadmium (a)	215.000
Cadmium (b)	222.500
Cadmium (c)	230.000
Aluminum, 99% plus, ingot	17.500
Magnesium, ingot	21.940
Nickel (f)	48.000

Domestic quotations, unless otherwise stated, are in cents per pound. Sterling exchange, checks, in cents. Quicksilver, per flask of 76 lb.

(a) Cadmium average based on the producers' quotation.

(b) Cadmium average based on the average of the producers' and platers' quotation.

(c) Cadmium average based on platers' quotation.

(d) Domestic, 5 tons or more but less than carload lot packed in cases, f.o.b. New York.

(e) Tin contained.

(f) F.o.b. Port Colborne, U. S. duty included.

signed to domestic consumers, 422 tons was for export, and 22,284 tons was for Government account. Producers' stocks of slab zinc dropped to 26,665 tons at the end of June. Imports of slab zinc in May, the latest month available, totaled 13,862 tons.

Tin was sharply higher in all markets on anxiety over Far Eastern developments. Straits quality tin in New York, prompt delivery, moved up from 78¾c. per pound at the beginning of the month to 97½c. as July ended.

Though it became known that Cuba will melt down about 80,000,000 silver pesos, containing around 60,000,000 oz. of silver, the price situation was viewed as fairly steady. The metal will be sold to consumers over a period of years, if necessary, so as not to disturb the market.

Quicksilver came to life on the Korean news, advancing to $78 per flask of 76 lb., prompt delivery.

Tungsten ore was tightly held at $24 per unit of WO_3, or $3 higher than a month ago. Manganese, chrome and antimony ores also were firmer.

In the field of light metals, Reynolds Metals raised its price of aluminum 1c. on July 19 only to rescind the advance two days later. Magnesium was advanced 1c. to 22½c., f.o.b. Freeport, Texas.

(*Continued on page* 105)

Major Metals

U. S. DAILY AND AVERAGE PRICES

	Electrolytic Copper (a) Domestic	(b) Export	Straits Tin New York	Lead New York	Lead St. Louis	Zinc East St. Louis
July 1950						
1	No Market	22.425	78.750	11.000	10.800	15.000
3	22.200	22.425	79.250	11.000	10.800	15.000
4	Holiday	22.425	Holiday	Holiday	Holiday	Holiday
5	22.200	22.425	79.750	11.000	10.800	15.000
6	22.200	22.425	80.500	11.000	10.800	15.000
7	22.200	22.425	81.375	11.000	10.800	15.000
8	No Market	22.425	81.500	11.000	10.800	15.000
10	22.200	22.425	82.750	11.000	10.800	15.000
11	22.200	22.425	84.750	11.000	10.800	15.000
12	22.200	22.425	86.750	11.500	11.300	15.000
13	22.200	22.425	91.500	12.000	11.800	15.000
14	22.200	22.425	97.000	12.000	11.800	15.000
15	No Market	22.425	97.000	12.000	11.800	15.000
17	22.200	22.425	92.000	12.000	11.800	15.000
18	22.200	22.425	91.000	12.000	11.800	15.000
19	22.200	22.425	89.500	12.000	11.800	15.000
20	22.200	22.425	91.000	12.000	11.800	15.000
21	22.200	22.425	93.000	12.000	11.800	15.000
22	No Market	22.425	93.000	12.000	11.800	15.000
24	22.200	22.425	96.000	12.000	11.800	15.000
25	22.200	22.425	96.000	12.000	11.800	15.000
26	22.200	22.425	97.500	12.000	11.800	15.000
27	22.200	22.425	97.500	12.000	11.800	15.000
28	22.200	22.425	95.000	12.000	11.800	15.000
29	No market	22.425	95.000	12.000	11.800	15.000
31	22.200	22.425	95.500	12.000	11.800	15.000
AVERAGES FOR MONTH						
July	22.200	22.425	89.715	11.660	11.460	15.000
AVERAGES FOR WEEK						
July 5	22.200	22.425	78.925	11.000	10.800	15.000
12	22.200	22.425	82.938	11.083	10.883	15.000
19	22.200	22.425	93.000	12.000	11.800	15.000
26	22.200	22.425	94.417	12.000	11.800	15.000
CALENDAR WEEK AVERAGES						
July 1	22.200	22.425	78.313	11.167	10.967	15.000
8	22.200	22.425	80.475	11.000	10.800	15.000
15	22.200	22.425	89.958	11.583	11.383	15.000
22	22.200	22.425	91.583	12.000	11.800	15.000
29	22.200	22.425	96.167	12.000	11.800	15.000

Silver, Gold and Sterling

DAILY AND AVERAGE PRICES

	Sterling Exchange "Checks"	Silver (c) New York	Silver London	Gold London	Gold (d) United States
July 1950					
1	(e)	(e)	(e)	(e)	$35.00
3	280.000	72.750	63.500d.	248s.	35.00
4	Holiday	Holiday	63.500d.	248s.	Holiday
5	280.000	72.750	63.500d.	248s.	35.00
6	280.000	72.750	63.500d.	248s.	35.00
7	280.000	72.750	63.500d.	248s.	35.00
8	(e)	(e)	(e)	(e)	35.00
10	280.000	72.750	63.500d.	248s.	35.00
11	280.000	72.750	63.500d.	248s.	35.00
12	280.000	72.750	63.500d.	248s.	35.00
13	280.000	72.750	63.500d.	248s.	35.00
14	280.000	72.750	63.500d.	248s.	35.00
15	(e)	(e)	(e)	(e)	35.00
17	280.000	72.750	63.500d.	248s.	35.00
18	280.000	72.750	63.500d.	248s.	35.00
19	280.000	72.750	63.500d.	248s.	35.00
20	280.000	72.750	63.500d.	248s.	35.00
21	280.000	72.750	63.500d.	248s.	35.00
22	(e)	(e)	(e)	(e)	35.00
24	280.000	72.750	63.500d.	248s.	35.00
25	280.000	72.750	63.500d.	248s.	35.00
26	280.000	72.750	63.500d.	248s.	35.00
27	280.000	72.750	63.500d.	248s.	35.00
28	280.000	72.750	63.500d.	248s.	35.00
29	(e)	(e)	(e)	(e)	35.00
31	280.000	72.750	63.500d.	248s.	35.00
AVERAGES FOR MONTH					
July	280.000	72.750	63.500d.	—	35.00
AVERAGES FOR WEEK					
July 5	280.000	72.750	—	—	—
12	280.000	72.750	—	—	—
19	280.000	72.750	—	—	—
26	280.000	72.750	—	—	—

Calendar week averages, New York Silver: July 1st, 72.750; 8th, 72.750; 15th, 72.750; 22nd, 72.750; 29th, 72.750.

(e) No market (Saturday).

THE above quotations for major non-ferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis. All prices, except gold and silver, are in cents per pound.

(a) Net prices at refineries on Atlantic seaboard. To arrive at the delivered New England basis add 0.300c. per pound, the average differential for delivery charges.

(b) Our export quotation for copper reflects prices obtaining in the open market and is based on sales in the foreign market reduced to the f.o.b. refinery equivalent, Atlantic seaboard. On f.a.s. transactions we deduct 0.075c. for lighterage, etc., to arrive at the f.o.b. refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingot bars; cathodes are sold at a discount of 0.125c. to 0.15c. per pound.

Quotations for zinc are for ordinary Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade zinc delivered in the East and Middle West command a premium of 1.10c. per pound over the current market for Prime Western; Special High Grade 1.25c.

Quotations for lead are for common lead. Corroding lead commands a premium of 10 points.

(c) The daily New York silver quotation reported by Handy & Harman is for silver contained in ores and other unrefined silver-bearing materials, in cents and one-eighth cent fractions per troy ounce. It is determined by Handy & Harman on the basis of actual sales of bar silver .999 fine in amounts of 50,000 ounces or more for nearby delivery at New York, and is usually one-quarter cent below the price paid for such bar silver, this deduction being the allowance for carrying, delivering, and marketing. In addition to foreign silver, the quotations also apply to domestic and Treasury silver if such silver enters into the New York market.

The Treasury's purchase price of newly mined domestic silver is 90.5c. per troy ounce 1000 fine, effective July 1, 1946. London silver in pence per troy ounce, basis .999 fine.

(d) U. S. Treasury's gold price. Actual payment by the United States Treasury for gold is at 99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.

Behind the By-Lines . . .

G. P. Lutjen

» **Whether you think of the Korean conflict** in the silk-hat, diplomatic-pouch terms of the UN officials as a "police action," or in the one-syllable epithets of the G. I. as a "war," the international situation has reached the point known in Navy parlance as "Condition Red." We can almost hear the steady, insistent clang of the ship's alarm, and the calm, impersonal voice on the P. A. system, "All hands, man your battle stations!"

As opinion and prediction get tossed around from jittery alarmists to fatuous stand-patters, it becomes difficult to make a clear-thinking assessment of the situation. But through the lies and counter-lies, the red herrings and gobbledygook, a few comforting facts stand out. Among the foremost, is the fact that U. S. and Canadian steel plants can produce just about as much steel as the rest of the world put together. Further, the steel companies have not skimped during the years of a highly theoretical peace since the last war in their search for the raw materials to keep those plants up to capacity.

In the past on the pages of *E&MJ* we have given accounts of the great new iron ore developments and what they mean economically and in terms of national security. In this issue we have asked **Mack Lake**, president of the Orinoco Mining Co., to tell you about one of the newest and greatest of the iron discoveries, U. S. Steel's Cerro Bolivar property in Venezuela. Mr. Lake reports on what were heretofore only hints, and digs under the glamour of the new strike, to discuss the facts of his company's $200 million plans for producing iron ore from Cerro Bolivar. As chief of exploration during the ground work, and now as president of the company that will do the developing and mining, Mr. Lake is eminently qualified to bring you this candid discussion.

» **Atom-minded citizens** will be interested to learn that the greatest concentration of energy ever produced by man against a single particle of matter has been unleashed at Columbia University's nuclear physics research center. The world's most powerful synchro-cyclotron, generating 385,000,000 electron volts, is now open for business. Already it has produced mesons and stuff like that. (After listening to the language of nuclear physics, we can sympathize with the old Tennessee Hillbilly who was horrified to learn that his daughter was attending a college where boys and girls were allowed to *matriculate* together.)

» **Speaking of concentration of energy,** people who measure such things inform us that a razor blade, in the course of a shave, exerts a pressure of 5 tons per sq. in. upon each whisker. Incidentally, production of this household juggernaut requires upwards of 5,000 tons of steel a year.

» **A hole, half the diameter of a human hair,** measuring 0.0006 in., has been drilled in metal by a technician at the Naval Ordnance Laboratory, White Oak, Md. Made in a piece of platinum for the hydraulic system of one of the Navy's new weapons, the hole may be one of the smallest ever drilled in metal in this country. (If you have any smaller holes, mail them to the Navy for a check.) The drill was made on a jeweler's lathe, but an ohmeter was necessary to indicate the drill contact.

Incidentally, is there a law which compels everyone to compare these microscopic drill holes with the size of human hair? Why not use gnats' eyebrows, ants' whiskers, or other standards, a little more stimulating?

» **Note for "hard money" men:** The largest size money in the world is current exchange on the Island of Yap, one of the Caroline group. It is made of stone, 30 in. in diameter and weighing over 100 lb. It is pierced with a hole in the middle to facilitate carrying on a pale. As might be expected, such coin is only used to effect weighty transactions. It has an exchange value of 10,000 coconuts, ¼ acre of land, an 18-ft. canoe or a wife.

» **Note for prospectors:** Maybe you will want to try a new expendable type of paper sleeping bag. Made of 2-ply laminated heavy kraft paper with an asphalt coating between and lined with a total of 3 lb. of cotton batting top and bottom, the bag has a 58-in. flap to form a tent over the sleeper's head. Total weight is 5½ lb. A limited quantity is available for test purposes at $3.90 each from Western Fire Equipment Co., 69 Main St., San Francisco 5, Calif.

» **Our vote for the Most Horrible Thought** of the Month goes to an item in a recent issue of Natural Resource Notes.

Every second your watch ticks, the federal government spends $210 more than it takes in.

» **In Canada's Northwest Territories** they have really separated the men from the boys. You may recall that the Sports Editor ran an item on mucking contests at Tonopah in last month's column. Winning time to muck one ton of quartz ore from one 4x6x1½-ft. box to another 3 ft. away was recorded as 7 min., 38.7 sec. A letter from J. G. McNiven, manager at Negus Mines, makes it clear that mucking in Nevada is in its infancy. He writes in part:

"According to our northern standards, that (7 min., 38.7 sec.) is not spectacular time. The first of July (Dominion Day) is always a big day here, featuring sports, etc. The winning time in the mucking contest this year, under similar conditions to that described in your item, was 2 min., 31 sec.

"Sorry I can't give you any data on hand steel contests. It is over 25 years since I last saw one. Our contest is run now with a drifter working on a tripod."

The Northwest Territories must have been stamping grounds for Paul Bunyan at one time or another. Be that as it may, we feel sure that the record time reported will go unchallenged—except perhaps in Texas.

ENGINEERING AND MINING JOURNAL

AUGUST, 1950

A Way of Life Died in Korea

NONE OF US KNOW, of course, what consequences may result from the conflict in Korea. Our Government apparently intends to see the thing through. Whether the Communist despots will back up the people they are using as catspaws remains to be seen, as does also the willingness of other members of the United Nations to stand by a determination to regain the ground lost.

Naturally any industry as essential as mining to emergency requirements will be affected by war or intensified preparations for war. The latter would seem to be the minimum consequence, as, even if the Korean affair does not widen into a major conflict, the American people now must realize that all ideas of placating the Soviet dictatorship are suicidal folly. Clearly, the only way to escape a major conflict is to be so well prepared that war will look like an unpromising venture to the Kremlin hierarchy.

War or serious preparations for war are likely to affect the mining industry in any of four ways: by increasing the demand for its products; by creating supply or manpower problems; by provoking price regulations or output allocation; and by affording an excuse to put Government into the mining business.

The last would seem like a far cry were it not that there is already a feeling in some Washington quarters that producers of non-ferrous metals are trying to avoid realization of all the production that present prices should afford. There have been new efforts to pry the Murray-Spence bill out of committee to authorize the entrance of Government into an industry whenever it should suit ambitious bureaucrats to decide that production or capacity is insufficient for national requirements.

The easy way of life of the past three generations in this country died in Korea. The luxury of peace at a moderate price is no longer an alternative, nor is any prospect of balancing the budget by lowering taxes, or of avoiding further inflation except by a sharp cut into living standards. Taxes will go up, inevitably, and stay up for a long time.

Our freedom is at stake. Now that the American people realize this, there can be no doubt of their will to defend it, at any cost.

On Identical Delivered Prices—Travel at Your Own Risk

PART OF THE PRICE WE PAY to enjoy big democracy is to have to endure such muddles as the current situation on the legality of basing-point and uniform delivered pricing and freight absorption (E&MJ, July, p. 88).

The general consensus is that under present law and interpretation, basing-point selling is illegal or dangerously close thereto. Delivered pricing is dangerous if it seems to accompany price collusion between sellers or seems to stifle competition between either sellers or consumers. The only pricing system which can be sure of Federal Trade Commission approval is FOB shipper's plant, treating all customers alike and reflecting production costs. But this involves difficult problems in a raw-material industry.

However, the situation is not as simple as portrayed above. No sellers have yet been found guilty for using basing points, delivered pricing or freight absorption unless there was deemed to be other evidence of restraint of competition

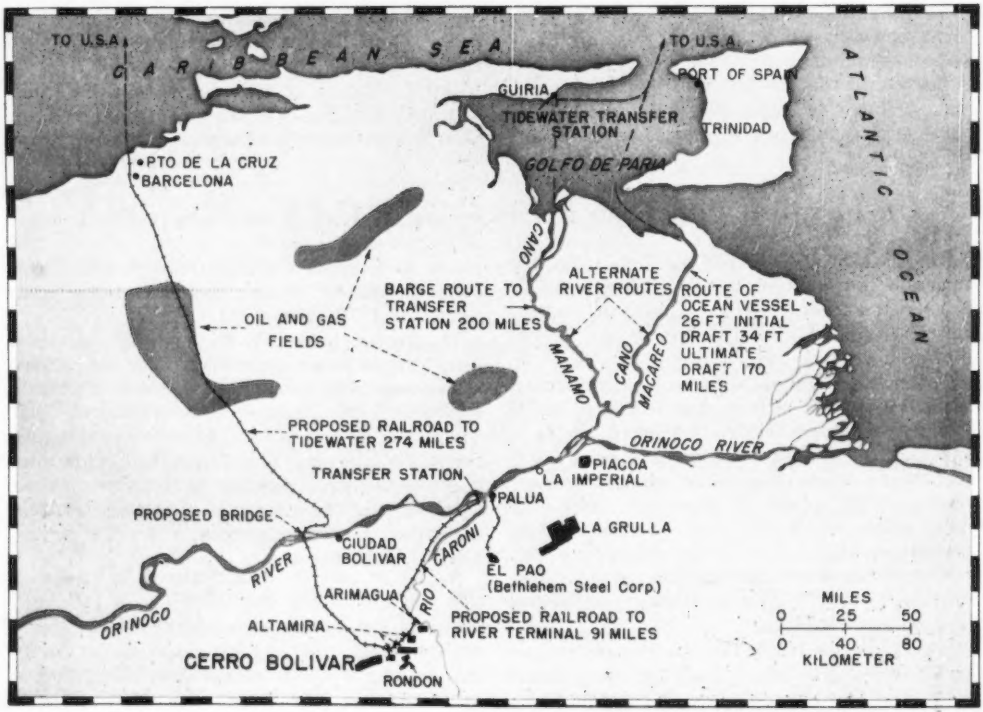
Sellers using systems which yield identical prices to a given customer may protect themselves in part by offering customers the alternative of an FOB price.

In general, both industry and the American people are in favor of preserving our competitive system, and the valuable drive which it imparts to productivity. However, it is unfortunate that the zealots on this subject do not recognize that the public interest is also deeply involved in mineral conservation, which can be best accomplished when some of the peaks and valleys, particularly the latter, are removed from the price picture (E&MJ, July, pp. 56-59).

Sooner or later the public interest in conservation will compel the countenancing of stabilized prices in the mineral raw-material field. Meanwhile, at least until the courts or Congress clarify the issues, the sellers of minerals must proceed with painful caution as to policies which involve identical prices to a given consumer or which can be interpreted by an unfriendly agency as destructive to full and free competition.

BONANZA IN THE RAW—This is Cerro Bolivar seen from the southeast.

CERRO BOLIVAR—U. S. Steel's



PROPOSED TRANSPORTATION ROUTES, here shown, are being studied, by which iron ore from Cerro Bolivar and other iron ore concessions of U. S. Steel Corp. in Eastern Venezuela can be moved to the United States. Bethlehem Steel Corp.'s railroad (also shown) from its El Pao deposit to Palua is already constructed.

High-grade iron orebodies cover nearly all this six-mile stretch of mountain. (See p. 74.)

New Iron Ore Bonanza

Few of the mining industry's new projects can match U. S. Steel's Venezuelan iron ore development at Cerro Bolivar in size, economic impact, or appeal to the imagination. Mr. Lake, who is in charge of the project, presents in this article a straightforward, factual account of the past, present, and impressive future of this great undertaking.

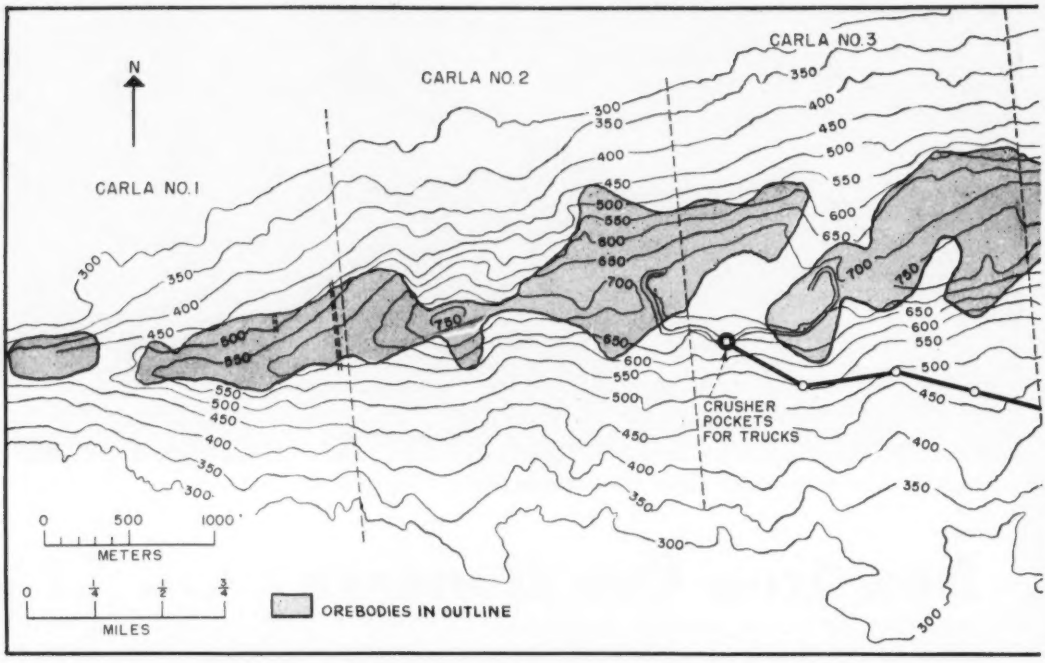
MACK C. LAKE
President, Orinoco Mining Co.
New York, N. Y.

WHERE YOU WILL FIND:

	On page
When iron ore was first mined in Venezuela	75
How Bethlehem's El Pao, and other orebodies, were found	74
The geology and probable origin of Venezuelan iron ores	76
How U. S. Steel's engineers found Cerro Bolivar	77
How Cerro Bolivar's ore occurs	80
How Cerro Bolivar's ore will be mined	82

The Search for Iron Ore South of the Orinoco

DURING THE 1920's a Venezuelan, while hunting in the hills near what is now the El Pao mine owned by Bethlehem Steel Co., picked up a piece of brilliant, high-grade iron ore and submitted it to a friend, who took it to Boccardo's hardware store in Ciudad Bolívar. F. D. Pagliuchi, an Italian mining engineer, who had been examining gold prospects in Venezuela at that time, noticed this specimen and became sufficiently interested to visit the property. He realized the importance of the discovery and with the financial assistance of the Boccardo family and a Cuban lawyer, Señor Diaz Pardo, proceeded to sample and



MAJOR FEATURES of initial development of iron ore on Cerro Bolivar, as planned.

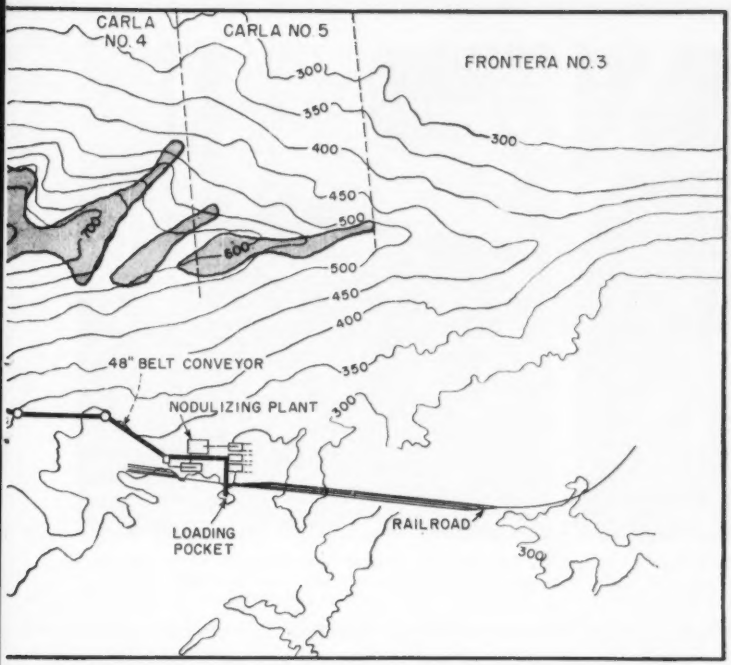
AN IRON ORE SLIDE, close up, on side of Cerro Bolivar. Such slides are numerous. They occur because of erosion of laterite pockets under the ore.

map the ore outcrops and denounce the claims.

The deposit was first examined by the Bethlehem Steel Co., but their option was surrendered. Mr. Pagliuchi then presented the prospect to the M. A. Hanna Co., who took an option on it. This was done after Mr. Pagliuchi's report had been studied by the writer, then chief geologist of the M. A. Hanna Co., and Earl E. Hunner, manager of the Iron Ore Division of M. A. Hanna and after the orebody later had been examined by Mr. Hunner. Earl K. Nixon, then assistant geologist of M. A. Hanna, was sent to Venezuela in 1928 to supervise the exploration of the orebody. This exploration continued for two years, and resulted in proving up a large tonnage of very high-grade, open-pit iron ore.

Hanna Drops El Pao

During the early 1930's, and at the depth of the depression, the Hanna company endeavored to obtain a modification of the terms of their option agreement, which called for the payment of a large sum of money at a time when dollars were very scarce. The owners refused to modify the agreement



Shading shows the ore as outlined in plan.

and the option was allowed to lapse. The owners then sold the property to the Bethlehem Steel Co., who organized the Iron Mines Co. of Venezuela, and proceeded to develop it. The Iron Mines Co. has stated that they expect to ship ore from this property to the United States this year.

During the course of the exploration of the El Pao mine, the Hanna company obtained some adjoining concessions by denouncement, which they still own.

A high-grade ore deposit known as La Represalia was discovered by a Venezuelan rubber-tree hunter about six miles south of the Orinoco River, not far from the River El Toro in 1939. This ore deposit, now owned by Venezuelans, has been explored by trenching, but has never been drilled. The ore is high-grade crystalline and dense.

Ferruginous Quartzites Extensive

Numerous outcrops of ferruginous quartzite occur south of the Orinoco River over a belt about 80 miles wide and extending from near the Atlantic Ocean for an indefinite distance westward. Large hills composed of ferruginous quartzite are situated not far south of Ciudad Bolivar. One is known locally as Monte Cristo.

The best known deposits of ferruginous quartzite are Piacoa and La Imperial. The Piacoa deposit, owned by Oliver Iron Mining Co., is near the Orinoco River southeast of Barrancas. The Imperial, owned by the Iron Mines Co. of Venezuela, is on the south bank of the river not far from Los Castillos.

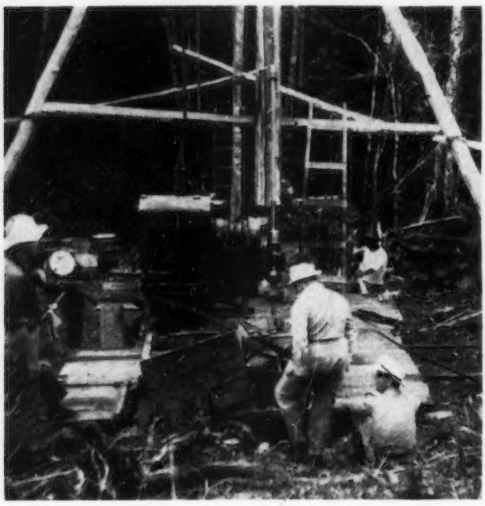
Leaching Releases Iron

Occurrence of the ferruginous quartzite is widespread throughout the district. It is composed of a mixture of iron oxide grains and what appear to be sand grains, but which have been classified by some geologists as recrystallized chert. These are cemented together by silica, and laminated with some iron silicate and probably iron carbonate. The iron content varies from a few percent to 40% in the fresh, unaltered rock. The exposed outcrops are usually weathered and altered at the surface, with some superficial enrichment to iron ore averaging 51 to 55% iron. The quartzite is often broken down into a loose, friable rock due to the leaching of the iron silicate and iron carbonate minerals and removal of the cementing silica. The Piacoa deposit will average about 45% Fe, and the iron oxide minerals can be released from the sand grains by crushing to sizes ranging from 6 mesh to 48 mesh. A substantial part of the iron is recoverable by gravity methods of concentration at 20 mesh. The ferruginous quartzite outcrops are usually conspicuous because of the presence at the surface of large amounts of iron ore *canga*, composed of pieces of iron ore and ferruginous quartzite cemented into a solid mass by secondary limonitic iron oxide. Such material will usually analyze about 50-55% Fe and may contain 12 to 20% SiO_2, although certain portions may consist of almost pure spongy limonite analyzing up to 59% Fe.

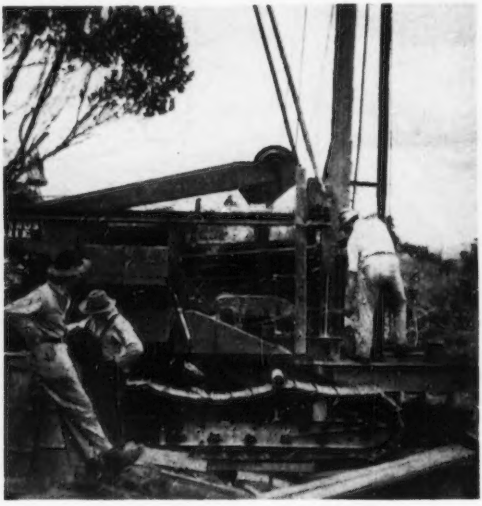
Early Mining Activities

IRON ORE WAS DISCOVERED in Venezuela by the early Spanish explorers. Ruins of an old Spanish furnace were found by Oliver Iron Mining Co.'s engineers at Mundo Nuevo, not far from Ciudad Bolivar. There was no historical record of this furnace or its operation in the files of the Venezuelan Government, but it is believed that the furnace must have been constructed at least 150 years ago and perhaps longer. Hammered blooms of wrought iron, about 5 in. square in cross section and 4 ft. long, were found near the ruins of this old furnace. These blooms average about 92% metallic iron. One of them is preserved in a monument at the office of the Orinoco Mining Co. at Ciudad Bolivar.

In 1887, one George Turnbull obtained a concession covering the Manoa ore deposit near the Orinoco River, about 50 miles from the Atlantic Ocean, and a shipment of 700 tons of ore was made from the deposit to Baltimore in 1901. The first important exploration and attempt to mine ore in Venezuela occurred during the period 1911 to 1913 at Manoa, at that time called the Imataca mine. This concession, operated by the Canadian Venezuelan Ore Co., resulted in failure, probably because of limited reserves of high-grade ore. The enterprise was shut down after approximately 70,000 tons of ore was shipped.



DIAMOND DRILLING on La Mina ridge in La Grulla district, proved good ore before discovery of Cerro Bolivar.



CHURN DRILL outlined orebodies at La Grulla and Cerro Bolivar when diamond drill ore recovery was low.

The rocks exposed south of the Orinoco throughout the ferruginous quartzite belt are probably all of Pre-Cambrian age. They consist of ferruginous quartzite probably lying unconformably above a great series of highly metamorphosed sediments of quartzites and argillites intruded by granites, gabbros, syenites, and diorites. The ferruginous quartzites have been intruded by some of these igneous rocks, although it is probable that there were certain igneous rocks that were older than the ferruginous quartzites.

Geological Studies Needed

Many years of careful geological study must elapse before the general geology of the Venezuela iron ore district can be accurately described and correlated. The distribution of the quartzite was extensive. Its thickness is unknown, but certainly equalled hundreds of feet in some localities, and was often interbedded with a softer argillaceous series which also contained some iron minerals. The grade of that horizon is lower in iron than the associated quartzite. The area has been subjected to erosion and peneplanation since the deposition of the quartzite, and has probably undergone several periods of uplifts and subsidence.

The area west of the Caroní River now consists of remnants of ferruginous quartzite ridges and isolated hills resting on a relatively flat plain consisting of the older, Pre-Cambrian complex series. Occasional granitic or other igneous rock hills, rounded with smooth surfaces, extend to heights above the plain nearly as great as the conspicuous quartzite ridges. The trend of nearly all the igneous rock hills and quartzite ridges is East-West to North 10° to 20° E. This area is grassy savanna with some heavy vegetation along the streams and running up the sides of some of the hills.

Topography east of the Caroni River is more rugged than the country west of the river, and consists of a series of generally parallel ridges of quartzite or earlier rocks whose top elevations are approximately 1,500 to 1,900 ft. above sea level. This area is covered by heavy jungle. Great faults have disturbed the rocks of the entire region. Some are of the thrust type that accompanied the folding, while others are of the normal type which accompanied the alternating subsidence and uplifts of the area.

The high-grade iron ores of the district are found as lenses within the quartzite series. Probably they were relatively pure iron oxide originally, laminated with iron silicate and iron carbonate minerals and relatively free from sand, chert, or argillaceous material. When exposed to weathering, this high-grade original rock broke down to a porous high-grade ore due to leaching of the silica, iron silicate minerals, and the oxidation of the iron carbonate. Some of the original magnetite and hematite was transformed into limonite and often the original iron oxide grains were loosened into a friable sandy horizon composed of nearly pure iron oxide of granular character. The Cerro Bolívar ore deposit is of this type.

The ores of the El Pao mine, the La Represalia deposit, some of the La Grulla district, and other scattered occurrences are dense and crystalline, very low in moisture loss on ignition, lacking in porosity, and averaging better than 65% Fe. These ore deposits have probably been metamorphosed and recrystallized by high-temperature alteration caused by the attack on the original high-grade lenses of the ore by hot water and gases emanating from the magmas of igneous intrusives.

What Is the Ore's Origin?

An intensive study is now under way to develop a more thorough understanding of the origin of these

How to Live Comfortably on Tropical Field Trips

THE AMERICANS EMPLOYED in the field as engineers, geologists, clerks, drillers, and mechanics lived during the period of examination and exploration in 14x16-ft. tents set up on plank platforms. These tents, of unique design, were made of a canvas treated with a compound which protected the material from mildew and rot. Some have been in use over four years and are still in good condition despite the severe conditions met.

The walls of these tents are screens made of a synthetic plastic thread which does not tear, break, or rot. The usual canvas walls on all four sides can be fastened to form an awning or dropped into normal position for warmth or to keep out the rain. The floor is heavy canvas. The front screen has a door controlled by two zippers. These tents are cool, insect-proof, comfortable and roomy. They are covered by a tarpaulin or a thatched roof which is built over the tent to provide shade.

The other camp buildings were made of round-pole framework, on which corrugated-metal sheets were nailed. Some of these buildings had a concrete floor, others had a plank floor. The tents and this type of construction both proved to be economical and extremely practical for living under tropical conditions in temporary camps during the exploration period.

Running water was delivered by gravity to the camp buildings for domestic use and shower baths. The camps were all electrified and it was therefore possible to use electric refrigerators and deep-freeze units. The workmen slept in hammocks under palm-leaf sheds with concrete floors. The laborers' camps were also equipped with shower baths. Most of the food for Americans was imported from the United States. The laborers' food was purchased locally. Cattle were slaughtered daily to provide meat for the camps.

ore deposits. This is a subject which will be open for research and discussion for many years to come.

E. C. Harder and R. C. Chamberlin, in their article "The Geology of Central Minas Geraes, Brazil," Journal of Geology, 1915, published a theory regarding the origin of the Brazilian iron ores. The iron ores of Venezuela are very similar to those of Brazil, and it is believed that the theory as developed by Harder and Chamberlin can best explain the Venezuelan ores. It is believed that the iron of the quartzite, as well as that of the higher-grade lenses, was deposited either as a subaqueous chemical precipitate or as the result of the action of iron bacteria which perform the function of changing soluble ferrous carbonate to insoluble ferric hydroxide. It is quite possible that an extraordinary amount of ferrous carbonate was available to feed a fantastic number of bacteria under conditions favorable to their existence at that time.

All of the known iron ore deposits of the Venezuelan district are found to occur on the tops of hills and ridges, sometimes extending down the slopes for distances as much as several hundred feet. The iron ore and quartzite have been more resistant to erosion than the associated rocks. Consequently the softer and more easily weathered rocks have worn away during the long period of erosion and the ferruginous quartzites and iron ore now occur usually as synclines on isolated hills or continuous parallel ridges resting on a relatively flat plain of the metamorphic and igneous rock complex series.

How U. S. Steel Found Cerro Bolivar

The Search Is Organized

THE QUESTION IS OFTEN ASKED: how did it happen that extensive iron ore deposits were found in Venezuela by the U. S. Steel Corp? The answer might probably be: "They were found as the result of vision, hard work, team work, financial support, and good fortune."

About 1944 John G. Munson, vice president of the United States Steel Corporation of Delaware, in charge of raw materials for the company, with enthusiastic support of B. H. Lawrence vice president, engineering, B. F. Fairless, president, and the directors of the company, prepared to make a comprehensive analysis of iron ore resources available to the Corporation. These studies indicated that the First and Second World Wars had used the high-grade, easily minable iron ores at an unprecedented rate, and it was necessary to proceed promptly to investigate the relative economic advantages of other possible reserves both in the United States and abroad.

Research to investigate the processes of concentration of low-grade iron ores of the Lake Superior District was accelerated, and geologists and engineers were dispatched to many parts of the world including the Caribbean area, Mexico, Central America, Labrador, Newfoundland, Alaska, British Columbia, Sweden, Africa, and Brazil. During the summer of 1945 the writer was engaged by the Oliver Iron Mining Co., a subsidiary of the Steel Corporation, as consulting engineer to supervise the examination and exploration of the iron-ore belt of Venezuela.

Mr. Nixon, who had been in charge of the M. A. Hanna 1928-1930 exploration in Venezuela, was employed as an assistant. With me, he arrived in Venezuela about the middle of September, 1945. He was the resident engineer in charge of the survey until he retired because of ill health in December, 1946. He was succeeded by Folke

LA FRONTERA, another mountain of iron ore, which adjoins Cerro Bolivar's six-mile stretch on its east end, is seen here on the left. The rounded mass beyond it to the right is Cerro Bolivar as it appears from this camera angle.

Kihlstedt, who has been resident engineer, working under my direction from January, 1947, to the present time.

A Systematic Survey

An office was established at Ciudad Bolívar, and a systematic survey of a region 80 by 200 miles in dimensions was begun, after the company had first obtained permission from the Venezuelan Government to conduct it. This area is about the size of the states of New Hampshire and New Jersey combined. From the very beginning of the work the Venezuelan Government has extended a warm welcome to the company and has generously cooperated in every way to assist. The Venezuelan people, from the highest government officials down to the laborers living in the area under examination, have been kind and friendly, and their cooperative spirit has been very helpful throughout our field investigations.

The climate of the area south of the Orinoco is healthy and pleasant. The days are hot, but the nights are cool. The trade winds blowing in from the Atlantic furnish a comforting breeze. American workmen do not complain about the weather.

A launch was purchased, and field parties were sent out to examine the hills which were most accessible from the river along the belt extending from Ciudad Bolívar down to the low swampy area near the ocean. Many small deposits of high-grade ore were examined during the first year of investigation, but none was considered large enough to justify exploration by drilling. The geological parties travelled on foot, and supplies were carried along on burros. Maps were made from surveys by Brunton compass, pacing or taping of distances, and aneroid altimeters to measure elevations. Samples were taken for analysis, and specimens of various rocks were secured and brought back to Ciudad Bolívar for classification and correlation.

Many miles of traverses were made south from the river back into the heavy jungle which is prevalent from the Caroní River to the Atlantic Ocean. The jungle is very dense east of the Caroní, with thick underbrush and vines which must be cut by a machete in order to travel. The vegetation is usually so thick that it is difficult to see more than a few feet. Progress is necessarily slow under such conditions. A group of ten to twelve laborers were included usually in each geological party to cut the jungle trails and assist in the survey work.

On several occasions during 1946 Mr. Nixon and I chartered airplanes and flew for hours over this jungle area in an effort to visualize the topography better and attempt to interpret the geology.

La Grulla Find Made

The country was unmapped and uninhabited, except along the river bank, or along the shores of small tributary streams flowing into the Orinoco. One of the most difficult and important explorations during 1946 was made by Wm. Boeckmann, field engineer, who was assigned the arduous task of making a traverse in a southerly direction from Piacoa to El Palmar, a distance of about 90 miles through extremely rugged and heavy jungle country which had never been visited by anyone except Indians and a few rubber-tree hunters. Mr. Boeckmann's traverse through this area revealed much interesting information. Many quartzite ridges were crossed, but no iron ore was found until he reached the eastern part of the district now covered by the La Grulla concessions.

Mr. Boeckmann's organization consisted of about 15 laborers and himself. Supplies were transported to the camp as it advanced day by day by burros. At times, water had to be carried in large cans packed on the burros' backs for many miles. The men all slept in hammocks and were protected from insects and bats by mosquito nets which enclosed the hammocks. The usual procedure in setting up a camp was to stretch a rope between two trees, throw a canvas tarpaulin over the rope, and hang the hammock below it. Food was cooked over an open fire. All water was filtered and boiled or treated with halogen tablets.

Several geological parties were continually traversing the jungle and examining the country in the same manner as Mr. Boeckmann. In that manner, many square miles of dense jungle country were examined and mapped in a preliminary way. Some of the other men who did outstanding work in charge of field parties during this period were Morgan Leonard, Fred Wright, Wm. Moyka, Vic Sigman, James Tenny, John Moore, Victor Paulik,

ALTAMIRA MOUNTAIN, as yet unexplored in detail, rises just east of Cerro Bolivar iron range. Slides of high-grade iron ore may be seen on its flanks.

Teopont Niculins, Nicolas Reformatsky, Cay Burrell, and Folke Kihlstedt.

A Promising Discovery

No high-grade ore deposits of sufficient size to warrant open-pit mining were found near the river, although the Piacoa concession was acquired by negotiation with the Venezuelan Government. It was selected as a promising, large, low-grade ore deposit which was conveniently located for river transportation. This orebody was drilled and carefully sampled for metallurgical investigation. A tunnel was driven into the hill and a deep trench was cut across the orebody. From this bulk samples were taken and shipped to the Duluth Laboratory of Oliver Iron Mining Co.

During the last few months of 1946 geological parties were directed to start eastward from an old road ,which ran from Upata to San Felix. Upata is accessible by a good gravel road from Ciudad Bolívar. These geological parties located and mapped a large number of iron ore outcrops in the area now covered by the La Grulla concessions, which were negotiated with the Venezuelan Government.

Drilling on the La Grulla deposit was started in July, 1948, and was completed in October, 1949. During that period a total of 15,496 ft. of diamond drilling and 6,056 ft. of churn drilling, or a total of both kinds of drilling of 21,552 ft. was completed in that district. A substantial tonnage of limonitic and hard crystalline ore occurring in scattered orebodies was proven up by this exploration.

Magnetic Surveys—Aerial Photos

The iron ore and the ferruginous quartzite are both partly magnetic. An extensive survey with Askania and Tiberg magnetometers was conducted over most of the orebodies of the La Grulla district in an effort to correlate geology with the magnetics to assist in geological interpretations and aid in diamond-drilling exploration. These traverses were run along sections 50 meters apart, and readings were taken at 10-meter intervals. The information gained by this magnetic study was of limited significance in guiding exploration, because both the ore and the ferruginous quartzite around it are magnetic in this area. Magnetic surveys at Cerro Bolívar were found to be helpful in outlining the iron-ore zone of the deposit. S. G. Sargis, of the Geneva Steel Co., contributed valuable assistance during the period of preliminary investigation of the magnetic characteristics of the various orebodies.

During 1946 the company was able to secure copies of trimetrigon aerial pictures in the possession of the Venezuelan Government, which were taken in the early 1940's by the U. S. Army in cooperation with that Government. These east-west flights spaced 20 to 30 miles apart covered much of the area south of the Orinoco we were studying.

Survey From Air Is Planned

Intensive study of these pictures, combined with the knowledge already gained from the ground survey, indicated that a complete aerial mapping would be valuable for furnishing accurate maps of the region and for providing a complete set of vertical aerial pictures for topographic and geological study with the aid of stereoscopic instruments. Mr. Kihlstedt and Cay Burrell, chief geologist, studied these possibilities very carefully and assisted in developing the plan of making an aerial survey of the region.

A contract was let to the Fairchild Aerial Surveys, Inc., of Los Angeles, to take the pictures and submit accurate mosaic maps of the district on a scale of 1:40,000, equivalent to 1 in. = 3,333 ft. The ground control was established by longitude and latitude observations by Mr. Niculins, an Oliver Iron Mining Co. engineer, at locations designated by the Fairchild company. The aerial photographic survey covered an area of about 11,000 sq. mi. It began Feb. 6, 1947, and was completed May 15, 1947.

A set of mosaic pictures divided into quadrangles of 10 minutes of longitude and latitude was delivered to the company along with a planimetric tracing of each mosaic quadrangle, on which was shown all drainage and any culture, such as roads, ranch houses, and similar pertinent information. These mosaics and tracings have thus served as base maps for geological mapping and as a base on which form lines of the topography have been drawn by engineers employed at Ciudad Bolívar. These maps have proved useful for geologic mapping, for planning developments, railroads and roads, and for showing property ownership boundaries.

Study of Aerial Mosaics Leads to Cerro Bolívar

The company geologists studied these aerial pictures carefully with the aid of the stereoscope and were able to correlate the topography visible in the pictures with the geology of areas which had been studied in the field. It was found that the ferruginous quartzite hills could usually be identified and differentiated from the areas underlain by igneous rock or the metamorphic complex series. Consequently it was possible to guide the field parties on examination with a great saving in time and effort.

About the first of the year 1947 there were two field parties working south from Ciudad Bolívar along the old ox-cart roads. One party was headed by Mr. Paulik and the other by Mr. Tenney. The first

orebody that was found in this area was located by Mr. Tenney on a hill known as Sabaneta, located about 30 miles northeast of Cerro Bolívar. It was found on the property of a Tadeo Schoen, of Ciudad Bolívar, who obtained title to the ore deposit by denouncement.

Cerro Bolívar Examined, Title Obtained

The study of the aerial pictures had indicated that the Cerro Bolívar hill looked particularly interesting as a possible ore deposit. Consequently Mr. Kihlstedt and Mr. Paulik on April 3, 1947, started for the hill in a jeep, and on April 4 they examined what is now known as the Cerro Bolívar orebody. This is a prominent hill about six miles long, which rises to a height of about 1,800 ft. above the savanna. East of the hill and separated by a low saddle is a sharp ridge known as La Frontera. Cerro Bolívar hill was formerly known as La Parida, and is thus shown on old atlas maps published in 1840 and all later maps.

It is a prominent landmark of the region, the highest and largest hill of a group extending in a general east-west direction for a distance of about 30 miles, which is described as the Cerro Bolívar-Altamira-Arimagua Range. Early in 1948, with the consent of the Venezuelan Government, the name of this hill was changed to Cerro Bolívar, in honor of the great Liberator of Venezuela.

Oliver Iron Mining Co. obtained title to the Cerro Bolívar hill by denouncement, and also acquired soon afterwards additional orebodies on other hills in the vicinity known as Rondon and Arimagua.

Two Venezuelan citizens named Jose Manuel Avila-Perez and Alfredo Gruber, and associates, acquired title to La Frontera and Altamira hills, which were later purchased from those owners by Oliver.

Four Other Deposits Also West of the Caroní

All of the concessions of the district west of the Caroní River were obtained by denouncement. At that time this land lying to the west of the Caroní was outside the zone of National Reserve, and therefore was open to denouncement. After these discoveries, that part of the state of Bolívar was also declared a part of the National Reserve, and further concessions in the Reserve had to be acquired by negotiation with the Government. Various properties acquired by the Oliver company in this area, and the date that they were acquired are as follows:

Carla 1-5, Cerro Bolívar	April, 1947
Arimagua 1-3	June, 1947
Rondon	July, 1947
Frontera, east end of Cerro Bolívar	Acquired from local claim holders, April, 1948
Altamira 2-6-7-8	Acquired from local claim holders, April, 1948

The location of the ore deposits situated on the Arimagua and Rondon hills and the selection of lands to be denounced was facilitated by the study of the aerial pictures. The detailed mapping and sampling of the Rondon and Altamira properties was done by Russell Bryan. The Arimagua deposit was mapped and sampled by Mr. Reformatsky.

Outcrops of iron ore were found on the tops of these hills which were similar in character to the deposit of iron ore on the Cerro Bolívar hill. The outcrops were carefully sampled and the ore analyzed, but no other exploration except mapping has been done on the properties up to the present time. The geology of the deposits is similar to that of Cerro Bolívar. The ore bed occurs as a closely folded syncline associated with the ferruginous quartzite.

The Cerro Bolívar Deposit—King of Them All

Half Billion Tons Proved

DIMENSIONS OF the Cerro Bolívar deposit are as follows: The length is about four miles, maximum width is 4,000 ft., average ore thickness about 230 ft., and maximum proven ore thickness 550 ft. The deposit consists of extremely closely folded ore layers and associated ferruginous quartzite, forming a syncline whose major axis coincides roughly with the top of the ridge. The synclinal axes of minor folds have a direction N. 70°-80°E. Due to prominent cross-buckling, some of the folds pitch east and others pitch west.

The iron ore is in part underlain by a footwall of hard, dense, unaltered, ferruginous quartzite, which analyzes about 40% iron, which is found in outcrops on the surface on the south side of the hill, and in many of the drill holes after passing through the orebody.

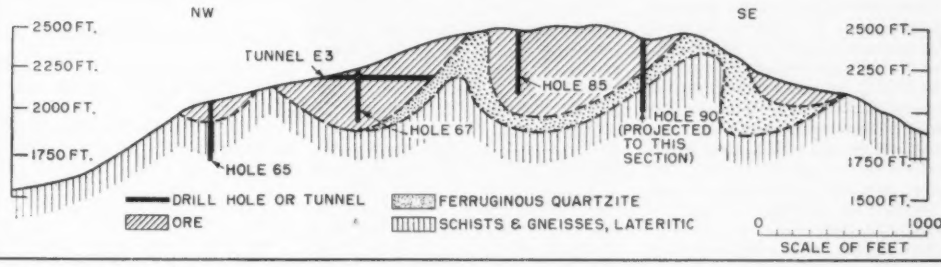
There is a rock layer which is closely associated with the ore, described locally as laterite, which is perhaps the weathered equivalent of a sedimentary, argillaceous horizon, or flow, interbedded with the ore-bearing bed, or the weathered equivalent of an igneous intrusive. Intensive geological study is being made of the ore deposit at present in an attempt to understand its stratigraphy more thoroughly and to identify and classify this weathered material. It has been encountered in many drill holes, and it outcrops in several places in topographic saddles where weathering has worn down the softer material.

Big Tonnage of Broken Ore From Great Slides

During the period of erosion and up to very recent times great slides have occurred on Cerro Bolívar, when enormous quantities of iron ore have slid down the mountain due to the erosion of the soft laterite which underlies the orebody in places. The spaces from which these ore masses moved are now great scallops of saucer-like depressions in the hill sides. The Cerro Bolívar camp is built on a ridge, several acres in extent, of detrital iron-ore boulders which came down the mountain in one great slide. It is reported by people living in the community that one important slide occurred on the north side of the hill about 25 years ago. No effort has been made to estimate the tonnage of detrital ore. It must be many tens of millions of tons.

About half a billion tons of high-grade open-pit iron ore has been proven to date on the Cerro Bolívar hill. Further exploration at Cerro Bolívar will probably expand known ore reserves. The orebodies of Rondon, Altamira, and Arimagua have been carefully mapped and sampled, but have not been explored. It is confidently expected that further exploration in the district will prove a very large tonnage of high-grade open-pit ore of a grade similar to that now proven at Cerro Bolívar.

		HOLE 65	TUNNEL E3	HOLE 67	HOLE 85	HOLE 90
IRON	%	60.73	64.16	64.5	61.50	63.17
PHOSPHORUS	%	0.18	0.13	0.127	0.185	0.10
SILICA	%	0.83	0.52	0.52	0.63	0.92
MANGANESE	%	0.11	0.10	0.10	0.08	0.09
ALUMINA	%	3.41	1.50	1.14	2.06	1.01
TITANIUM OXIDE	%	0.19	0.08	0.000	0.21	0.03
SULPHUR	%	0.004	0.002	0.054	0.001	0.009
IGNITION LOSS	%	8.36	6.29	6.51	9.16	7.84
FEET OF ORE		140	670	340+	365+	400



A SECTION THROUGH CERRO BOLIVAR showing the ore and generalized geological structure. Composite analyses of the exploratory tunnel and four drill holes are given. Note very low sulphur, high iron content.

The average grade of the Cerro Bolivar ore deposit is (dry analysis) about 63.50% iron, 0.106% phosphorus, 2% silica, 0.11% manganese, 1.90% Al_2O_3, and 5.20% loss on ignition. The moisture content probably averages about 8%. The natural iron content is calculated to be about 58.40% iron. The ore is practically sulphur-free and does not contain any other objectionable elements.

The ore is a mixture of hematite, limonite, and a small percentage of magnetite. The limonite has been formed by the weathering of the other minerals of the original ore rock. The ore is generally porous and friable. It can be drilled easily with jackhammers or churn drills. In places the weathering has broken down the dense, hard, laminated hematite and magnetite into loose sand-like grains, which, although very high in grade, will require sintering or nodulizing to prepare a suitable product for blast-furnace smelting.

Near the surface, the ore deposit will not produce an excessive percentage of fines, but as mining progresses deeper into the orebody, it will be necessary to screen the ore and process the fines by agglomeration or nodulizing. If such a process is adopted, this may be done most economically in Venezuela, where vast reserves of natural gas are available at the oil fields in the eastern part of the country. There is no present market for that gas and the cost should be low. The elimination of moisture and loss on ignition would increase the grade of the ore from about 58.50% iron natural to about 65 to 66% iron natural. The cost of beneficiation of the ore would be partly paid for by the resultant saving in freight and the benefit to the blast furnace through the improvement in the structure of the ore.

Drilling Begins

Actual drilling exploration at Cerro Bolivar began Oct. 2, 1947, and was carried on continuously until May 27, 1949. During that period about 90 diamond-drill and churn-drill holes were put down, with a total footage of approximately 22,270 ft., of which 18,640 ft. was in iron ore. About 13,935 ft. of this total was drilled by diamond drills and about 8,335 ft. by churn drills. Three tunnels were driven into the orebody to check the accuracy of the drill sampling. The length of these tunnels was 113, 1,320, and 685 ft. Information relating to the structure and the weight of the ore, as well as moisture content and chemical analysis, was obtained from samples taken from these tunnels.

The diamond drilling was done under contract with E. J. Longyear Co., under the direct supervision of Rudolph Gebhardt, engineer, and Axel Augustson, foreman. The churn drilling was done by Oliver Iron Mining Co. employees, using Bucyrus-Erie 27-T machines which drilled a 6-in. hole.

Diamond drilling proved very difficult because of the fractured and loose nature of the ore. The holes had to be cased, and reaming and frequent cementing delayed progress. The casing was kept within 5 ft. of the bottom of the hole at all times.

Core recovery was low, but such cores as were recovered were split and analyzed separately for comparison with the analyses of the sludge samples. In most instances it was not necessary to case the churn-drill holes. Churn-drilling costs were from one-quarter to one-fifth of the cost of the diamond drilling.

Water for the drilling operations was obtained from a mountain stream, which flowed into a reservoir formed by an earth-filled dam near the campsite. It was pumped in one lift to an elevation of about 1,000 ft. to a concrete tank at the top of the ridge above the camp. The water flowed from this tank by gravity to the various drills below that elevation. Later, a pump was set up at this reservoir which pumped water to an elevation of an additional 500 ft. into steel tanks, from where it was distributed by gravity to the drill locations below that elevation. Further east on the hill, water for drills was secured from local lagoons, which are near the top of the ridge.

Many miles of roads were built on Cerro Bolívar, over which the drill equipment and supplies were transported to the drill locations. Many of these roads had to be blasted out of solid ore. All were mapped and all road cuts were carefully sampled and the samples analyzed.

Roads and Bridges Built

Construction of several concrete bridges was necessary between Ciudad Bolívar and the mine. The one over the Orocopiche River was a nine-pier bridge with a concrete slab supported on steel beams between the piers. Several other concrete bridges were built, over which the water will flow during flash floods, but which are high enough to bridge the normal stream flow during the wet season.

An airport was constructed at Cerro Bolívar which can accommodate DC-3 planes.

All the analytical work was done by John Hollensteiner, company chemist, in the laboratory at Ciudad Bolívar. Check samples were sent to the company laboratories at Duluth and Hibbing, Minn., for check analyses. The split core has been preserved in boxes filed in the company sample building at the property. Sludge samples have been preserved in bottles properly labeled for future reference.

Supplies were hauled from the Ciudad Bolívar office to the field in tandem-drive heavy trucks, Jeeps and four-wheel-drive Power Wagons were used for transportation of men from Ciudad Bolívar to the property and to haul supplies and men around the hill during the progress of the exploration. D-8 angledozer tractors and bulldozers with scrapers were used to improve the road between Cerro Bolívar and Ciudad Bolívar, and D-8 and D-4 angledozer tractors were used for road building on the hill.

How Cerro Bolivar Ore Is To Be Mined and Shipped

Stripping Unnecessary

PLANS HAVE BEEN MADE to mine the ore, which will not require stripping, by large power shovels, probably electric-driven, loading it into trucks. These will haul the ore to a primary crusher situated near the orebody and a few hundred feet below the very top of it. The top of the hill will be sliced off in 35 to 50-ft. horizontal cuts. The crushed ore will be lowered about 1,000 ft. to railroad cars or the ore-storage pile at the elevation of the railroad tracks, by belt conveyor. The plan of this mining operation and the method of loading the ore from the stockpile to railroad cars is now being carefully studied. Detailed plans are not yet available.

Tentatively, it is planned to haul the ore to the shipping port over a standard-gage railroad in gondola cars of about 100 gross tons capacity in trains of some 100 cars, each powered by diesel-electric locomotives. The ruling grade is expected to be 0.2% against the loads and 0.8% against the empties. In special cases it may be more economical to operate on slightly steeper grades to reduce the total initial construction cost. The cars will be dumped by rotary dumps. The ore may be either stored at the port in large stockpiles, loaded by belt conveyors direct into the ore vessels, or sent first to a screening plant for sizing and agglomerating of the undersize before shipment.

How to Get the Ore to U.S.

During the past two years a careful study has been undertaken to evaluate the best and most economical method of transportation of the ore from the mine to the United States. The S. J. Groves & Sons Co., construction engineers, working under the direction of Francis Thomas, vice president, with the assistance of G. L. Link, location engineer, has located a railroad route in a preliminary way from the mine to the junction of the Caroní and Orinoco Rivers, a distance of about 90 miles, and from the mine to Barcelona, about 270 miles. The Barcelona route requires an expensive bridge across the Orinoco, which has been tentatively located and designed by E. G. Amesbury and J. O. May, American Bridge Co. engineers. The proposed location for this bridge is about 12 miles upstream west of Ciudad Bolívar.

A Hydrographic Survey

The Gahagan Overseas Construction Co. have made a careful hydrographic survey of the Orinoco River and the Cano Macareo from Ciudad Bolívar to the Atlantic Ocean. The river study has determined that it would not be feasible to try to float large ships up the Orinoco above the Caroní Junction because of the presence in that channel of many sand bars, which would require excessive maintenance dredging, and many rock ledges, which would have to be blasted to provide a deep channel at low water.

Channel Sought

The Orinoco splits into a number of tributaries as it spreads over its delta on its way to the Atlantic. The main mouth, the Boca Grande, is blocked by a 15 to 20-mile bar just beyond where it empties into the Atlantic. The depth of the water over this bar is about 16 ft. at low tide.

The Cano Manamo is crooked, has many sand bars, and is blocked by a bar 15 to 20 miles wide beyond where it flows into the Gulf of Paria. The depth of the water over this bar is 14 ft. at low tide.

It does not appear feasible to use either of these routes to dig a deep channel for ships to pass into the Orinoco River. The Orinoco and the Cano Macareo offer possibilities for the dredging of a channel with lower annual maintenance costs than either of the other two routes mentioned.

The Gahagan company, with Col. Robert Warren in charge, measured the depth of the water with a sonic depth-finder attached to the company launch, the Spindle. The aerial photographic maps were used as a base for detail mapping, as hundreds of profiles of the river were obtained by cruising back and forth across the river. The information gained by this investigation was plotted on the maps and provided the fundamental facts on which to base the estimates of yardage which would have to be dredged to secure channels of various depths. A tug was equipped with a drill. This tug boat, accompanied by a house-boat to accommodate the crew, moved from place to place, and drill holes were bored in the river bed to test the character of the material which will have to be dredged.

Other Aerial Surveys

During the past few months the Fairchild company has completed the taking of a new set of pictures of the river route from the Caroní junction to the ocean to produce an

accurate map on a scale of 1 in. equals 200 ft. The ground control of this map was obtained by astronomical observations at a number of points along the river. An accurate map will be provided by this survey, which will be useful in laying out any dredging program and which can also be utilized for the accurate planning of the exact position of the channel and the aids to navigation which will be installed to mark the channel.

The Fairchild company has made a topographic map on a scale of 1:5,000, 1-in. equals 416 ft., and 5-meter contour intervals, of the Cerro Bolívar hill from the 1:40,000 aerial survey pictures. This map was developed from the aerial pictures and a triangulation ground control and leveling survey of the area by company engineers. Fairchild is now preparing topographic maps on a similar scale and contour interval, of the route from the mine to the Caroní junction and from the mine to the bridge site. It also planned to take pictures of the route from the bridge site to Barcelona in order that it will be possible to secure a topographic map along the strip of the proposed route from the mine to Barcelona. The work is being done along both routes to provide accurate information to use promptly for further work as soon as the route has been chosen.

Orinoco—The New Subsidiary

The properties and other assets in Venezuela of the Oliver Iron Mining Co. have been transferred to the new subsidiary of the United States Steel Corp., the Orinoco Mining Co. The executive office of this company is in New York and the field office will remain at Ciudad Bolívar, Venezuela.

Helpful advice and assistance in organizing and conducting the examination and exploration of the Venezuelan iron ore deposits were rendered by Le Roy Salsich, then president of Oliver Iron Mining Co., and Guy Diehl, vice president, both of them since retired; also by R. T. Elstad, president of Oliver today, and Forbes B. Cronk, recently retired, who was then general mining engineer.

All legal matters relating to the iron ore concessions in Venezuela were handled by the law firm of Dr. J. M. Travieso Paul, of Carácas, and their New York associates, the firm of Schuster and Davenport.

R. J. Wysor, formerly president of Republic Steel Corp., has served as consultant to the U. S. Steel Corp. during the past year in the careful analysis of the over-all picture of the significance of this discovery and the use of the ore in the future operations of the corporation. Coordination of plans for the use of Cerro Bolívar ore with U. S. domestic reserves, future concentrates from taconite and other low-grade deposits, and various foreign ore, of course, is of great importance.

F. H. KIHLSTEDT, on Cerro Bolivar. He was in charge of group of ore hunters that first climbed the mountain of rich iron ore on April 4, 1947.

Harmon Lewis, formerly president of the Alcoa Steamship Co., is consultant in charge of the ship investigation. A series of ship designs are being investigated to determine the most economical ship to transport the ore from Venezuela to the United States.

Gen. Max C. Tyler, now retired but formerly of the U. S. Army Engineer Corps and who has had extensive experience in the Mississippi River flood and navigation control, is acting as consultant on matters relating to the river problem.

Further investigations of the railroad problems are now under the supervision of G. G. Lancaster, formerly assistant chief engineer of the C. & O. Railroad.

These investigations are being coordinated and studied in an effort to determine the most advantageous route and manner to transport the ore to the United States.

A Great Natural Resource

The geological investigation, exploration, and acquisition of the iron ore deposits of Venezuela are preliminary steps in a comprehensive program which will result in the development of a great natural resource needed to supplement the iron ore reserves of the United States. The success of this undertaking can be attributed to a large extent to the team work and coordination of the resources available to a great corporation. A very large sum of money has been spent to date, and vastly greater sums must be spent for the development and transportation facilities.

The field organization not only had the finances available to do a thorough job but has been able to call on, and has been supported by, engineering, purchasing, operating, accounting, legal, and other departments of the Oliver Iron Mining Co. and the raw material, engineering, and legal departments of the U. S. Steel Corporation of Delaware. The U. S. Steel Export Co. has assisted in the shipment of supplies and equipment, and the Union Supply Co. in the furnishing of food and other supplies required for the job. Other subsidiaries such as the vessel, dock, and railroad companies, and the Warrior & Gulf Navigation Co. have made valuable contributions in the study of the transportation problems.

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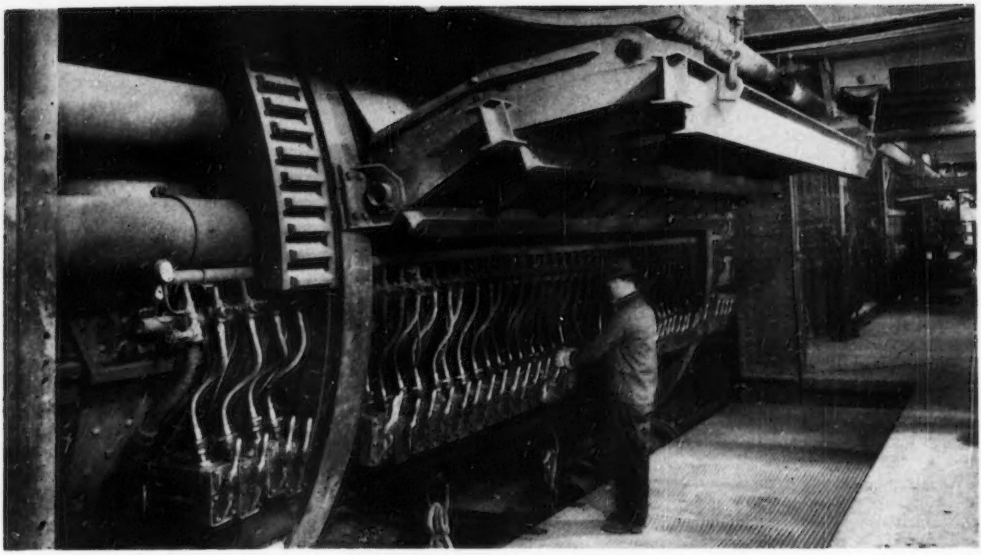
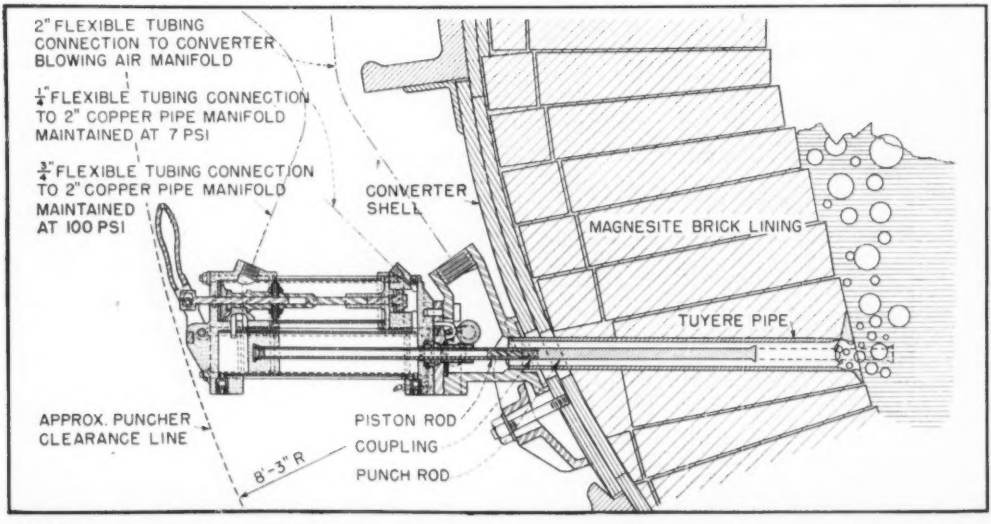


PNEUMATIC TUYERE PUNCHERS installed on this Pierce-Smith converter have increased converter production 20%, eliminated a disagreeable job, and freed a man for work elsewhere in the smelter.

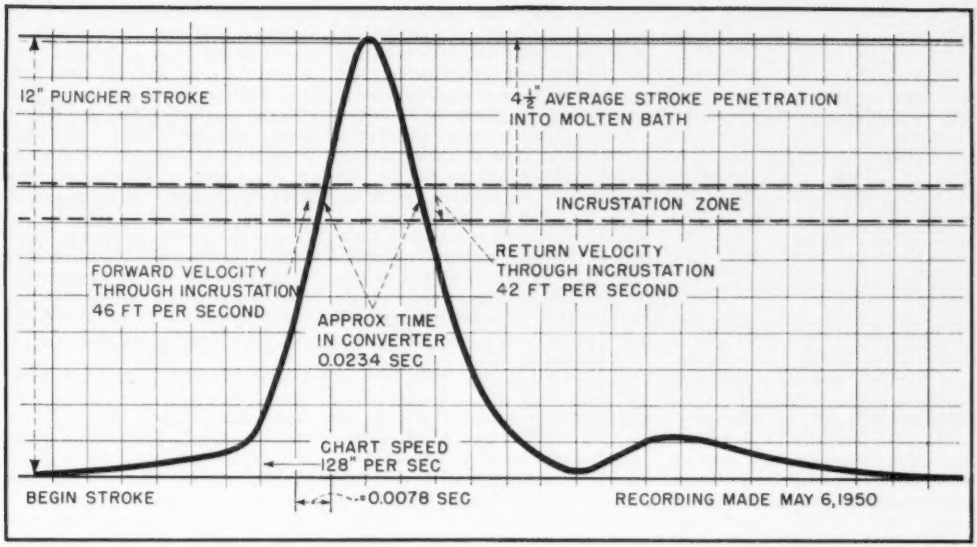
Mechanical Converter Tuyere

JOHN B. HUTTL
Associate Editor

MECHANICAL PUNCHING of copper converter tuyeres, for many years the thought and desire of every smelter man, has become an established fact at the McGill smelter of Kennecott Copper Corp., McGill, Nevada. Here, two large Pierce-Smith converters fully equipped


2" FLEXIBLE TUBING CONNECTION TO CONVERTER BLOWING AIR MANIFOLD
¼" FLEXIBLE TUBING CONNECTION TO 2" COPPER PIPE MANIFOLD MAINTAINED AT 7 PSI
¾" FLEXIBLE TUBING CONNECTION TO 2" COPPER PIPE MANIFOLD MAINTAINED AT 100 PSI
CONVERTER SHELL
MAGNESITE BRICK LINING
TUYERE PIPE
APPROX. PUNCHER CLEARANCE LINE
PISTON ROD
COUPLING
PUNCH ROD
8'-3" R

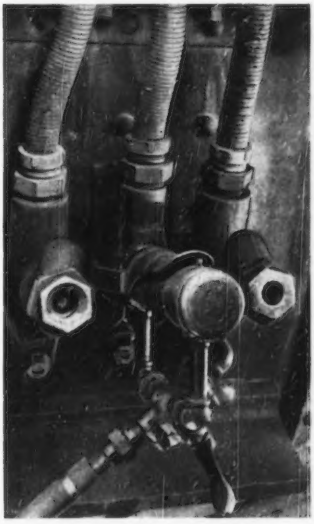
TO OPERATE press valve to open inlet port. High pressure air forces piston forward, building up air cushion at front of cylinder. Part of this air goes through duct to actuate small piston which disconnects lever and opens valve to exhaust. High pressure air cushion returns piston. Time elapsed—1/50 sec.


12" PUNCHER STROKE
4½" AVERAGE STROKE PENETRATION INTO MOLTEN BATH
INCRUSTATION ZONE
RETURN VELOCITY THROUGH INCRUSTATION 42 FT PER SECOND
FORWARD VELOCITY THROUGH INCRUSTATION 46 FT PER SECOND
APPROX TIME IN CONVERTER 0.0234 SEC
CHART SPEED 128" PER SEC
BEGIN STROKE
0.0078 SEC
RECORDING MADE MAY 6,1950

KYMOGRAPH accurately measures and records stroke velocities and characteristics. Knowledge gained from studies made with this instrument led to better timing of the stroke and improvements in mechanical design.

Punching at the McGill Smelter

with pneumatic tuyere punchers of local design are in operation. The first installation was made almost two years ago, and working results have more than measured up to expectations. Use of these units has made the once difficult, disagreeable and at times hazardous job of punching the tuyeres of a copper converter one much sought after now by the smelter worker, as well as freed one converter attendant for work elsewhere in the smelter. In addition, tuyere punching by mechanical means has increased the production rate of each converter about 20 percent, and refractory consumption per ton of blister produced is lower.



FIRST UNIT installed required excessive maintenance but proved practicality of mechanical puncher.

Puncher Requirements

The puncher used, known as Model 6B and covered by patents issued to the late Leonard Larson, general superintendent, Reduction Plant, and Byron T. Berge, mechanical department engineer, and assigned to Kennecott Copper Corp., is the outgrowth of several years of comprehensive experimental work involving design, construction, testing, and redesign of earlier units. In tackling the original problem of designing an effective puncher unit several requirements had to be taken into consideration, among them (1) the pneumatic device must give a short rapid forward stroke with the punch rod, and a similar stroke backward; (2) use of a special adapter to accommodate the puncher so designed that it can be substituted for the conventional Dyblie valve head and thus make possible both mechanical and hand punching; (3) a practical and simple arrangement that will permit quick attachment and detachment of the puncher; and (4) the entire puncher assembly must be an integral part of the converter and rotate along with the tuyere line to all positions required for converter operation.

Tests with earlier puncher units equipped with slide valve arrangement (at left) to control the piston stroke demonstrated the necessity of relatively high stroke velocities if difficulties as encountered in hand punching were to be avoided. With units having stroke velocities from 15 to 18 ft. per sec., punch rod tips often stuck in the tuyere accretion, and even when accelerated to 28 ft. per sec. bottoming of the piston in the forward end of the cylinder and poor timing of valve reversal causing bounce and a hesitation at the end of the forward stroke frequently resulted in

broken piston rods and stuck rod tips. In hand punching operations, it was observed that the operator who generally failed to effect a rapid rate of removal or acceleration of the punch rod following a controlled depth of penetration into the molten bath of the converter spent a large part of his time hammering the punch rod through the incrustations on both the punching and withdrawal strokes.

Hand-Punching Difficulties

It was claimed that one of the difficulties lay in the fact that a portion of the molten bath followed the end of the punch rod back into the tuyere for a distance of several inches when the rod was withdrawn slowly. The incrustation formed in the tuyere opening by the drag of metal back into the tuyere when hand punching was largely eliminated by a rapid mechanical stroke. Obviously, the coating or incrustation adhering firmly to the inside of the tuyere reduces the size of the tuyere opening below that of the punch rod tip and must be sheared through with the next punching stroke.

Air escaping to the atmosphere between the tuyere bushing and the punch rod during hand punching operations effects a drop of about 50 percent below the air supply pressure. In mechanical punching this loss does not occur and the flow of air is cut off twice on each stroke during a very short interval (about 1/50 sec.), and as a consequence the pressure of the blowing air acting on the molten bath does not drop below the supply pressure.

Rate of acceleration effected by man during hand punching operations is estimated at less than 300 ft. per sec.,[2] when exerting a push or pull of from 50 to 60 lb. on a punch rod weighing about 6 lb. This slow action precludes maintenance of a tuyere opening larger than 1 in. by hand punching. Another important fact established is that the area of the punch rod tip should not exceed one-half the inside area of the tuyere pipe. This applies to both hand and mechanical punching. If this ratio is upset, then there is danger that the molten converter bath may partially flow back into the tuyere pipe because of excessive air pressure drop at the puncher rod tip.

Early in 1945 experimental work was greatly facilitated and advanced with the advent of a special testing apparatus, known locally as a "Kymograph," to accurately measure and record stroke velocities and stroke characteristics. Knowledge gained from these studies led to the development and construction of a new valve reversal mechanism resulting in a better timed punching and withdrawal stroke, and general improvements in the mechanical design of the puncher proper, adapter, and method of attachment—all embodied in puncher Model 6B now in use. From the accompanying curve (page 85) taken on the Kymograph it will be seen that punching stroke velocity through the incrustation is 46 ft. per sec.; return or withdrawal stroke velocity, 42 ft. per sec.; penetration into molten bath, 4 to 5 in.; and time in converter, about 1/50 sec. Illustrations on page 84 show a cross-section of Model 6B puncher with method of attachment to converter shell, and a complete installation, including shield and movable platform.

How It Works

As seen, the puncher proper consists of two cylinders made from 3-in. inside diameter chrome-moly steel tubing; aluminum-alloy cylinder heads, with valve ports incorporated in the rear head; automatic valve reversal mechanism; piston; and operating lever. The puncher is attached to the adapter by two side rods, and only a few minutes are required to remove and attach a unit. Operation of the puncher is as follows: Pressing the valve handle or lever opens the inlet port, high-pressure air thus forces the piston rapidly forward. The air trapped in the fore end of the cylinder as a consequence is built up to a cushion pressure of several hundred pounds per square inch. A part of this air passes through a connecting duct and actuates a small piston, which, in turn, disconnects the handle and opens the valve to exhaust. With an open exhaust port the high-pressure cushion mentioned returns the piston rapidly to the starting point. Proper adjustment of the exhaust port allows the piston to come to rest at the rear end of the cylinder without a bounce. In other words, the manual forward movement of the valve handle together with the pneumatic valve reversal mechanism completed the punching stroke.

High-pressure air for the puncher installations is furnished at 90 psi. by a 160-cfm. compressor. Output of this unit is large enough to supply three converters fitted with mechanical punchers. Actual consumption of high-pressure air per puncher round reaches a peak of about 50 cfm. for an average duration of ½ min. Average total leakage rate per converter is 8 cfm. (leakage mostly through connections, valve, seals, etc.). Of the two converters in operation, one, somewhat smaller in size, is equipped with 45 tuyeres, with the tuyere pipe inside diameter being 1-11/16 in. and the punch rod tip 1-3/16 in., and the other with 43 tuyeres, with a tuyere pipe inside diameter of 1¾ in. and punch rod tip 1¼ in.

Dimensions

Each mechanical puncher has an over-all length of 17 in. and weighs about 45 lb. The alloy-steel cylinder containing the operating piston is 15 in. long, giving a piston stroke of about 12 in. The punching rod attached to the piston rod by a small steel coupling is made from ¾-in. round hot-rolled iron. Its full life, generally extending over many months, depends upon operating conditions, but when worn or damaged may be readily replaced. With a puncher stroke of 12 in., the punch rod used is of such length as to penetrate the molten bath of the converter about 5 in. at the end of the forward or punching stroke. The position of the rod tip at the beginning of the stroke is about 7 in. from the discharge end of the tuyere pipe. As the brick lining in the tuyere zone becomes thinner, the punch rods are shortened accordingly. Rod tips require reforming about every 10 days. The punchers proper require relatively little maintenance, and this consists of daily oiling of the valve mechanism housed in the upper cylinder, and greasing every second day of the lower air cylinder assembly. Good grade light to medium compressor oil is used. General inspection, servicing, and repair of punchers are done at the smelter repair shop.

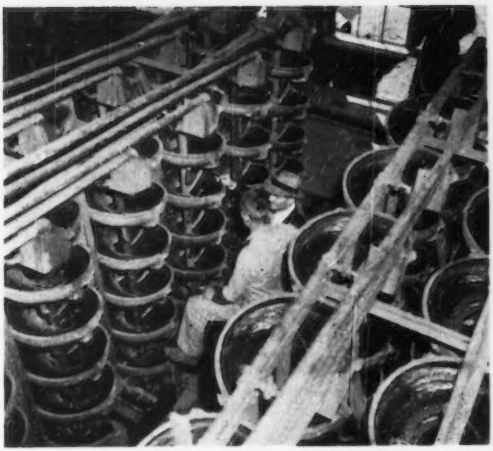
Thanks are given to J. C. Kinnear, vice president, Kennecott Copper Corp., for permission to publish the aforegoing article. The many courtesies shown me while at McGill smelter recently and the help given me in gathering data presented in the article by Walter S. Larsh, general manager; J. C. Kinnear, Jr., assistant general manager; E. Pesout, smelter superintendent; Byron T. Berge, mechanical department engineer; and E. G. Schulz, smelter plant general foreman, are acknowledged and greatly appreciated.

The Humphreys Spiral—

Some Present and Potential Applications

This article outlines the place in mineral dressing won by the spiral, and suggests new flowsheets where it might well be used.

JAMES V. THOMPSON and WHITMAN E. BROWN, Denver, Colo.[1]



TESTING spirals in an Iron Country pilot plant.

SINCE THE ORIGINAL installation of the Humphreys spiral concentrator on Oregon chrome sands (E&MJ, Oct., 1943) many applications have been developed. Its value can be firmly established by noting its diversity of use in the mineral dressing field, where over 2,700 spirals are now in operation.

It seems fitting, at this time, to review briefly some of the outstanding installations. Other possible uses have been demonstrated by test work. Several flowsheets with discussion are presented showing these present and proposed applications.

For the benefit of those who may not be familiar with the Humphreys spiral, the following are the general requirements for successful concentration with it:

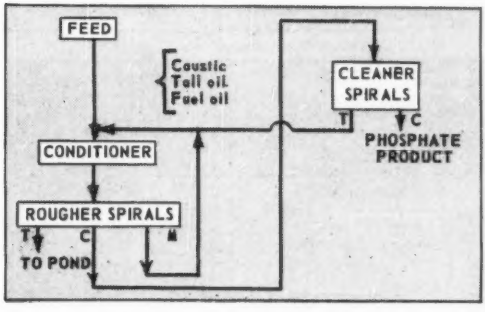
1) There must be a significant difference between the specific gravity of the gangue and of the valuable mineral. This difference should be at least one whole specific gravity point. Exceptions are found as, for example, micaceous and phosphate ores as mentioned later.

2) The minerals to be separated must be free. This may be accomplished by crushing and grinding, but the mineral may be free in the ore as mined, as in placer sands.

3) Generally, minerals to be recovered should be within the size range of minus 10 mesh and plus 200 mesh.

Within the area thus outlined, the spiral has been found to offer the advantages of low power consumption, low installation and maintenance costs, small floor space requirement (4 to 5 sq. ft. per ton hourly capacity), and low labor cost for supervision.

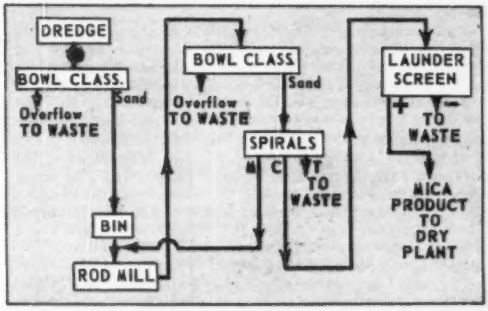
The closed circuit test unit, employing a full size spiral, is used to determine the amenability of an ore to spiral concentration. As little as 15 lb. of sample can be used to indicate if an ore can be concentrated with spirals. In almost all cases plant results have duplicated test results.



OPERATING FLOWSHEET NO. 1
International Minerals & Chemical Corporation
Achan, Florida
PEBBLE PHOSPHATE RECOVERY

Other than the phosphate removed by screens, the Humphreys spiral concentrator is the sole means of phosphate recovery in this plant. There is almost no difference in the specific gravity of quartz and phosphate rock. Concentration in spirals is effected by reagentizing the feed, using caustic, tall oil and fuel oil mixed with the ore at a high percent solids. Phosphate is recovered in the outer portion of the spiral channel. Silica sand and heavy minerals are removed as a tailing through the "concentrate" ports on the inside of the spiral channel.

Spirals are also used in conjunction with other beneficiation processes in the Noralyn and Peace Valley plants of International Minerals & Chemical Corporation in Florida.



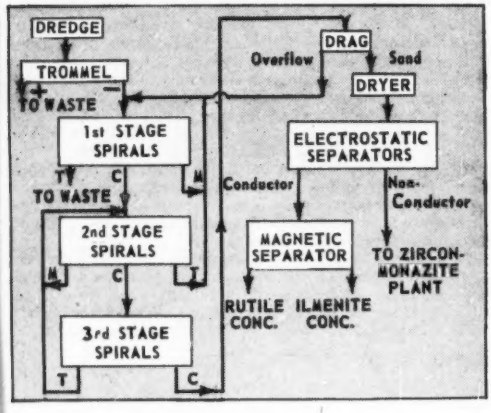
OPERATING FLOWSHEET NO. 2
The Funkhouser Company, Hartwell, Georgia
MICA RECOVERY

[1]Metallurgical engineers, Humphreys Investment Co., Engineering Division, Denver, Colo.

This new plant employs 12 Humphreys spiral concentrators for cleaning flake mica. Original test work was done by North Carolina State College of Agriculture and Engineering. Operating data are not yet available.

It is interesting to note that the so-called "concentrate" from the spiral operating on mica ore is waste, whereas the mica is found in the outer fast water "tailing" of the spiral discharge. On mica the concentration effected by the spiral is a result of a shape factor rather than specific gravity differences. The mica flakes are caught in the fast water of the spiral's outer channel and thereby separated from quartz and feldspar. In order for the spirals to work well on mica, the feed must be prepared in a manner to delaminate the "books" so that the flakes will be swept into the fast tailing water.

Mica produced in this plant is used primarily in the roofing trade with other higher quality markets in mind. A good discussion of simplifying mica cleaning flowsheets is entitled "New Methods for Recovery of Flake Mica" by Ralph Adair, W. T. McDaniel, W. R. Hudspeth which was presented at the 1950 AIME meeting in New York. The launder screen for dewatering and slime removal in the final product is described in AIME Technical Paper 2532F. by W. J. Parton



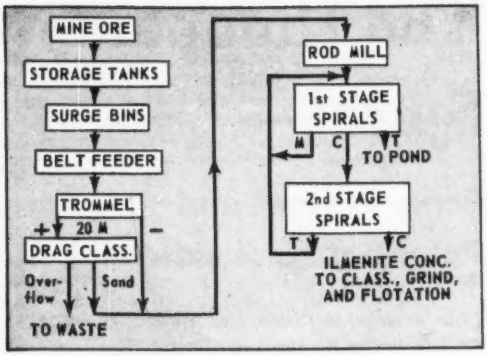
OPERATING FLOWSHEET NO. 3
Humphreys Gold Corporation
ILMENITE AND RUTILE RECOVERY

This is the Humphreys Gold Corporation plant near Jacksonville, Fla., operated under contract with Rutile Mining Co. of Florida, which was first described in E&MJ for March, 1945.

Sand containing ilmenite, rutile, zircon, monazite and other heavy minerals is mined by a suction dredge and pumped to the spiral plant. Three stages of spirals produce a final bulk heavy mineral concentrate.

The heads contain from 3 to 11% heavy minerals. Recovery of heavy mineral is about 86% and the bulk concentrate has a grade of 88% to 96% heavy mineral. There is very little +48 mesh and very little −200 mesh in the feed and no true middling (locked particles). The "middling" shown on the flowsheet is taken from the lower 2 turns of the spiral and is composed of mixed free minerals. By recirculating the middling, a clean concentrate and a clean tailing are possible. The recirculated middling also helps smooth out feed surges from the dredge.

The bulk heavy mineral concentrate is dried and passed through electrostatic separators. Conductive material is passed over magnetic separators making a finished rutile and a finished ilmenite concentrate. Non-conductive material is treated in four stages of spirals making a concentrate, which is dried and treated as above for recovery of zircon and monazite.

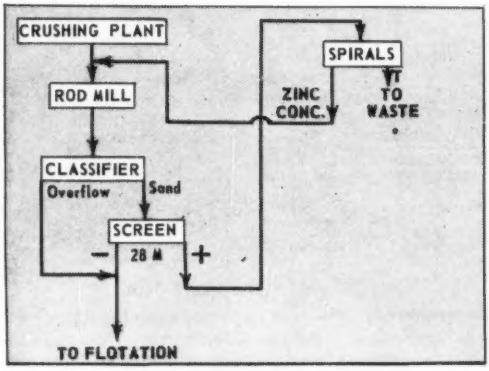


OPERATING FLOWSHEET NO. 4
American Cyanamid Company
Calco Chemical Division, Piney River, Virginia
ILMENITE RECOVERY

Twenty-four Humphreys spirals in two stages are used in this plant, which produces ilmenite concentrate for the manufacture of pigments.

Final concentration is effected by flotation, but much of the plant is devoted to preparation of feed for the flotation circuit. One of the difficult problems here is the liberation of the fine ilmenite from a clay matrix, and the thorough removal of the clay slime, before flotation. After the coarse fraction of the ore has passed through the rod mill there still remain mud balls of 48 mesh and finer. If these are allowed to enter the flotation circuit they disintegrate, producing secondary slime that is very detrimental to flotation. Removal of these fine mud balls is the main task of the spirals, but in accomplishing it the spirals also effect considerable concentration, rejecting about 50% of the spiral feed as tailing. The use of the spiral in this plant has resulted in reduction in size and operating cost while increasing efficiency of the flotation plant.

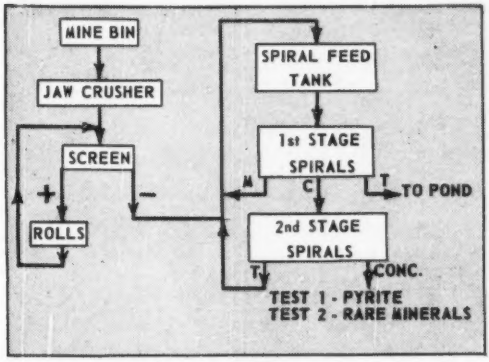
A detailed discussion of this operation entitled "Milling Operations at Piney River, Virginia" by C. E. Craven, E. Hladky, C. J. Kirkland was presented at the 1950 AIME annual meeting in New York.



PROPOSED FLOWSHEET NO. 1
SPHALERITE RECOVERY

This arrangement is the result of test work on the classifier rake product of a zinc mill. The plus 28 mesh from the screen was treated in a Humphreys spiral, which rejected minus 10 mesh, plus 28 mesh tailing having as low

an assay as the subsequent flotation tailing. The advantage of this system is in the rejection of a coarse tailing without further grinding. Test work on the unscreened classifier rake product indicated that even more tailing could be rejected at a satisfactory assay without the screen. Elimination of this unit might be preferred by many operators.



PROPOSED FLOWSHEET NO. 2
PYRITE RECOVERY
RARE MINERAL RECOVERY

This is a very simple gravity mill employing the Humphreys spiral concentrator. Requirements of an ore to be treated in this mill are:

1) Values released when crushed to about 1½% plus 10 mesh.

2) Values do not slime much.

This flow sheet was used on two ores in the Humphreys laboratory and gave very good results.

A pyrite ore, mined for the manufacture of sulphuric acid, when crushed to 1½% plus 10 mesh contained only 8.6% minus 150 mesh. Gangue mineral is quartz. Over-all recovery of 85% was made in two stages of spiral concentration, and the grade of the concentrate is above requirements assaying 50% sulphur. With such a simple flowsheet it is doubtful if the remaining 15% of the pyrite in the ore would be worth the fine grinding and flotation circuit required to recover it.

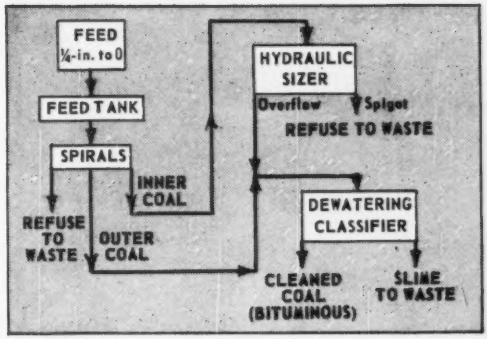
On a pegmatite ore containing 10% rare heavy minerals, the ore was crushed to about 2% plus 20 mesh with only 15% minus 200, the minus 200 mesh fraction containing very little of the rare heavy minerals. Recovery was 96% of the heavy minerals and the grade of the concentrate is 60% heavy mineral. In two stages an almost pure concentrate of heavy minerals can be made.

A single spiral installed in Mexico to treat a free milling gold ore gave good results with a similar treatment.

PROPOSED FLOWSHEET NO. 3
BITUMINOUS COAL RECOVERY

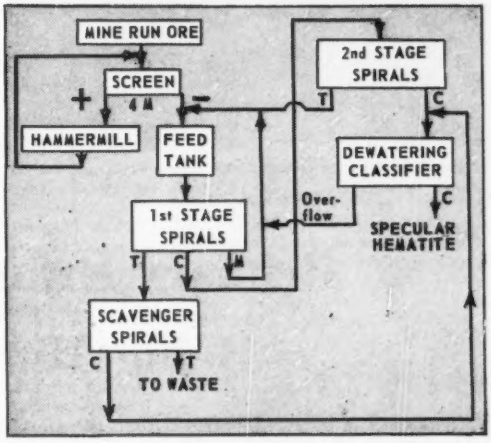
This flowsheet has been investigated respecting many minus ¼-in. bituminous coals. At present it is in operation on a pilot plant scale in Canada.

High ash refuse is removed through the concentrate ports. High velocity water entering the discharge box contains, in the extreme outer portion, low ash coal. The inner portion of the discharge stream is composed of 6 to 20 mesh slate and 20 to 65 mesh coal. The discharge stream is split into finished coal and sizer feed fractions by means of a baffle in the discharge box. A mixture of this nature is ideal for a hydraulic sizer. In many cases the sizer overflow is as low in ash content as the spiral coal product.



Sizer underflow, which is refuse, is often higher in ash than the spiral refuse.

Floor space requirement for spirals operating on coal is about 4 sq. ft. per ton of hourly capacity. The sizer also occupies little floor space for the capacity. For this flowsheet the sizer is of special but simple design. Since the separation in the sizer is made at only one velocity of upward current the velocity in all sizer pockets would be the same and each pocket would receive feed instead of the usual series feeding.



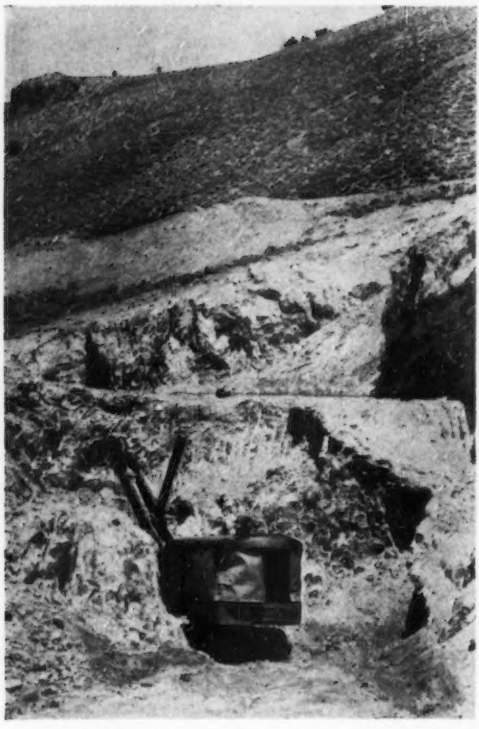
PROPOSED FLOWSHEET NO. 4
SPECULAR HEMATITE RECOVERY

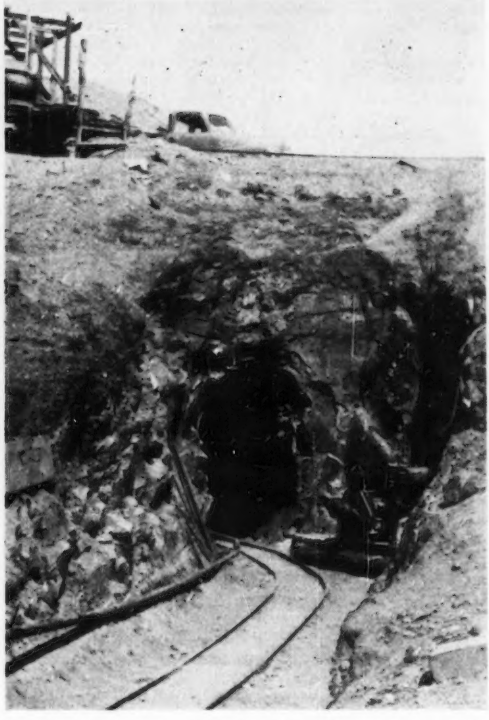
Exclusive of grinding equipment which is common to most plants this flowsheet is very simple in its concentrating section. Very little space will be required compared with other methods, and the foundation for the spirals will be very light compared to vibrating, power driven machines.

The ore tested required almost no crushing because it is nearly all minus 4 mesh as mined. The iron mineral is specular hematite with gangue of mica and quartz and is about 13% minus 200 mesh as mined. The problem is to double the plant concentrating capacity without adding to the floor space assigned to concentration and to reduce the operating cost of the concentrating plant.

Satisfactory metallurgical results were shown. From a feed containing 44% iron, recovery of 88% of the iron units was made in a concentrate assaying 66% iron.

It is estimated that if half of the present tables are removed and this area used for spirals, the plant capacity can be doubled.





URANIUM ORE is coming from these workings, among others, in Marysvale area. LEFT, in the Farmer John open pit. Dump ahead is from Vanadium Corporation's shaft. RIGHT, VCA's Freedom tunnel and winze.

Primary Uranium Ore Now Being Mined in Utah

How individual prospectors proved up, and are developing a productive, and hitherto unsuspected, uranium mining area

JAMES QUIGLEY
Consulting Geologist
Eureka, Utah

A NEW URANIUM FIND in Utah has attracted increasing attention since an ore-buying depot was established by the Atomic Energy Commission at Marysvale in that State. The ores consist of the secondary mineral, autunite, a calcium-uranium phosphate, and some pitchblende underlying autunite in brecciated and sheared zones. About 150 tons is being produced per day, largely from the Farmer John open pit of the Bullion-Monarch Mining Co., with some from the Freedom and Prospector leases of the Vanadium Corporation of America. A third operation, Lane Bertelson's Buddy claim, which has produced some autunite, is not shipping at present. Pitchblende has been produced only from the Prospector.

The deposits are in the Antelope Range in Piute County, Utah, four miles northeast of Marysvale, a town on U. S. Highway 89 and which is the southern terminus of a branch of the Denver, Rio Grande and Western R.R. The Durkee district, in which the finds have been made, has produced a little gold, silver and iron in fluxing ores, and some alunite (potassium-aluminum sulphate). Marysvale has always been the supply center for the Durkee and other nearby districts and the shipping point for still other districts to the south.

When World War II began, interest in the alunite of the Marysvale district was again aroused. The Kalunite Co. proposed to make both potash and alumina from the alunite, and diamond drilling, geological studies, and actual mining were conducted by it and various government agencies. Some of the easily accessible lower-grade replacement alunites of the Antelope Range were mined, and the gravel roads which now serve the uranium dis-

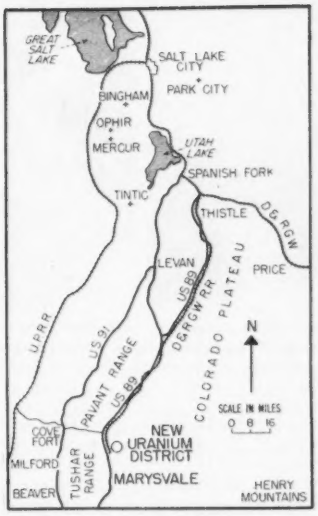
trict were built to handle alunite.

After the war, a few prospectors were certain that they knew where they could find uranium. Pratt Seegmiller, who was operating his own service station and mineral specimen business in Marysvale canyon, at the spectacularly altered "Big Rock Candy Mountain," was sure that the red and yellow hills around his station were a good bet. His wanderings led him to the Farmer John claims, with which he was familiar. He had often looked for fluorspar crystals in the tunnel, which follows a narrow fluorspar vein on the western edge of the property, two miles east of Marysvale Canyon. Yellow-stained monzonite in an old pit on a knoll above the tunnel attracted his attention, and in 1947 he sent some of it to Jess Abernathy, a fellow mineral dealer of Moab, in the carnotite country of eastern Utah. Abernathy reported that the sample carried uranium. Pratt bought his own counter, arranged for the sale of his business, and set out to find the best in the district.

Uranium Turns Up

In the meantime, Bullion-Monarch, which had been operating a lead-silver prospect on the west side of Marysvale, acquired a lease on the Farmer John claims from their locator, J. W. Sargent, of Marysvale, for the purpose of mining the fluorspar in the tunnel, to sell it to the Geneva Steel Co. R. C. Dunsmore helped in arranging this agreement. Later that year Dunsmore and Nels Cooper, secretary of the Bullion-Monarch Co., noticed the yellow-stained monzonite above the tunnel and sent some to a commercial assayer for analysis for uranium. The report was negative and it was not until Cooper took some to the Bureau of Mines' Mineral Identification Laboratory in Salt Lake City in April, 1949, that they learned that uranium was present in their ground. At this time, people in Marysvale were getting suspicious that Pratt Seegmiller had found something worthwhile.

Seegmiller felt that the time had come for action, and called in two cousins, Merlin and Leonard Anderson, of Elsinore, 20 miles north of Marysvale, who sent for a fellow townsman of theirs, Rex Smith, then, as now, working for the Vanadium Corporation of America. They located the Prospector group south of the Farmer John and the Freedom group that Seegmiller had located. Smith sent for D. W. Viles, vice president in charge of western operations for the Vanadium Corporation, who signed up both the Seegmiller and the Anderson groups on long-term leases. They began stripping and sinking, following this by surface and underground diamond drilling.



NEW URANIUM DISTRICT near Marysvale is about 200 miles south of Salt Lake City at southern end of D.R.G.&W. branch line.

Meanwhile the Bullion-Monarch stripped their showing and were diamond drilling to test the ore at depth. That summer they concluded an agreement with the Atherly Brothers, mining contractors of Eureka, Utah, who had been mining copper ore on the Kaibab Plateau in Arizona and shipping through Marysvale. The Atherlys moved in their heavy equipment and began extensive stripping work.

The Rush Is On

In the meantime, the Johnson-Dunsmore-Gibbs, the Fulmer, the Hetherly, the Rosequist, the Henry-MacIntosh and other groups of claims were being located and the rush was on. As late as October California deer hunters were still scattering location notices around. It is not uncommon to find half a dozen notices in the same discovery monument. Well over 1,000 claims were recorded.

From the beginning the district hoped to ship its ores to Rifle, Colo., where the U. S. Vanadium Corporation mill was being operated for the AEC's Colorado Plateau ore-buying program. The AEC paid a haulage allowance to Plateau shippers of 6 cents a ton-mile, up to a maximum of $6 per ton which, if it had been applicable to rail freight, would have covered the cost of shipping from Marysvale to Rifle. However, milling and other difficulties interfered and the Bullion-Monarch began a long series of talks with the AEC, which finally resulted in the establishment of the ore-buying depot in Marysvale in March, 1950, operated for the AEC by American Smelting and Refining Co. with Verne Tarne in charge.

The Geology

Antelope Range is a down-dropped block of volcanic flows and intrusive rocks lying between the western scarp of the Colorado Plateau (and separated from it by the Sevier fault) and the Tushar Range on the west, from which it is separated by the Tushar fault. The Sevier river, the largest in central Utah, cuts a canyon through the western end of the range. The area has been described briefly by B. S. Butler and others in U.S.G.S. Professional Paper 111, "The Ore Deposits of Utah.[1]

The rocks exposed in the area of the new uranium find consist of an older series of flows and volcanics (latites, dacites, tuffs, etc.) intruded by a coarse-grained monzonite. This in turn is intruded by finer-grained monzonites, which grade

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[1]The following published and open-file reports also are available on the Marysvale, Utah, area—The Editor.

Published—Survey publications: Callaghan, 1938, Bull. 886-D. Loughlin, 1916, Bull. 620-K. Butler and Gale, 1912, Bull. 511.

Open-file reports—Willard, Preliminary report 3-192, Manning Creek alunite deposits (map and text); press release 12/4/45. Also Willard, Winkelman alunite deposit (2 maps and text); press release 4/17/45.

Outside publications: Volcanic Sequence in the Marysvale Region in S. W. Central Utah, American Geophysical Union Translations, 20th Annual Meeting; Part 3, pp. 438-452, National Research Council, August, 1939.

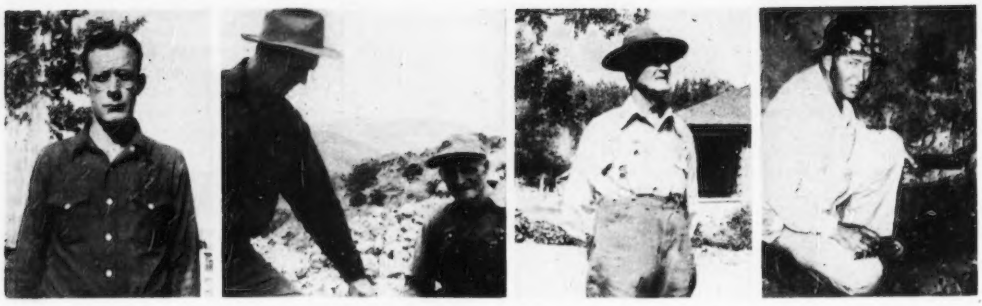
Hild, J. H., Bureau of Mines R.I. 3972, 1946.

Willard, M.E. and Proctor, P.D. *Econ. Geol.*, Vol. 41, 1946. White Horse alunite deposit, 24 pp., 35 figs.

Verley, T. and Reid, W. S. Utah Univ. Bull., Vol. 11, 1920. Extraction of potash, etc.

In addition there is unpublished material, not in shape at present for open file, in the Survey's Denver office. It is understood that Lincoln Paige, at Denver, is willing to permit individuals to peruse this material and to assist them with specific questions wherever he can.

A study of the volcanic sequence of the district has been published by Eugene Callaghan in the Transactions of the American Geophysical Union for 1939.



UTAH'S NEW URANIUM DISTRICT owes much to these men. Here are, left to right: Pratt Seegmiller, who found the area's first uranium; Brig and Loren Atherly, Eureka contractors, now mining for Bullion-Monarch; John Henry, old-timer in the district, but actively prospecting; Lane Bertelson shown Geiger-testing a stope in his Buddy mine.

into granitic phases. A blanket of siliceous rhyolite then covered the area, which has since been partially removed by erosion, leaving irregular patches and exposing the older rock underneath. Thus the contacts are irregular and unpredictable.

The ore being mined is found in the older, coarse-grained monzonite. Autunite has also been found in the rhyolite and in weak alunitization in the earlier volcanics, and some has been found coating cracks in the fine-grained intrusives. As yet, none of these three latter types of occurrence are producers. The ores mined are found in zones of breaking where weak fissures and groups of fissures extend outward from the coarse-grained, monzonite-rhyolite contact or parallel to it. The fissures are iron-stained and carry some fluorspar and quartz. More often the fluorspar and quartz occur as blebs away from the individual break but within the zone of breaking. These breaks are often interconnected with ladder-type fissuring. In the autunite ore, the feldspars and ferromagnesian minerals of the coarse monzonite are broken down to iron-stained clay minerals. This is probably alteration by the sulphuric acid released by the weathering of pyrite at the surface because the monzonite surrounding the fresh pitchblende ores of the Prospector shows very little alteration. These ores consist of blebs and veinlets of pitchblende and some sooty black mineral and a good deal of pyrite underlying weathered autunite ores in a zone of breaking on the surface.

The Individual Deposits

The Farmer John. The principal deposit, the Farmer John, located by J. W. Sargent, is under lease to the Bullion-Monarch who have contracted for the mining work with Atherly Brothers, of Eureka, Utah. The ore zone extends east and west along a peculiar bulge in the rhyolite-coarse-grained monzonite contact for 200 ft. The western edge of the zone terminates against a dike-like rock, which is probably a chilled phase of the finer-grained intrusives. The dump and heavy overburden cover the ore zone to the west. The ore is being mined by surface methods, in a cut 30 ft. wide along the contact. The rhyolite appears to be the hanging wall, dipping 45 deg South.

The ore is a soft, crumbly, iron-stained, clayey rock with bright specks and flakes of the yellow-green uranium mineral, autunite, through it. This mineral loses its greenish cast after being exposed to the sun for an hour or so, turning bright yellow. Torbernite (copper-uranium phosphate), which is also sparingly present, does not lose its greenish cast. Schroekingerite (uranium carbonate and sulphate), a powdery yellow mineral, appears closest to the surface. Uranophane (calcium-uranium silicate) has also been identified.

With the Geiger counter no appreciable result was obtained from the surface of the Farmer John other than the normally high background count which exists throughout the Antelope range. A pit sunk many years ago through 3 ft. of rhyolite debris and 3 ft. of solid rock supplied the only clue. In it at the bottom yellow-stained monzonite was found which gave an appreciable kick. As stripping progressed it became evident that there was a barren layer of bedrock heavily stained with iron and 3 ft. or more thick just under the overburden. Below this zone some yellow autunite appeared, but only sparingly. The ore of shipping grade lay 10 ft. or more below the bedrock surface.

This type of ore is still being mined by a ¾-cu. yd. shovel and has not been bottomed, although better than 6,000 tons have been produced. A tunnel is being driven from the west to intersect the ore zone at 115 ft. depth.

The Prospector. Half a mile south of the Farmer John is the Prospector, located by the Anderson cousins and Rex Smith, of Elsinore, Utah. The property is under lease to the Vanadium Corporation of America. Here a narrow zone of breaking extends in a N. 60 deg. E. direction from the rhyolite contact. The Corporation mined about 500 tons of autunite from surface pits and by sinking a 30-deg. incline on the fissure zone. This tonnage was shipped to Naturita, Colo. At a vertical depth of 70 ft. the monzonite lost its bleached, iron-stained appearance and fresh pyrite with smaller flecks of autunite appeared. There was also a black sooty mineral similar to the manganese oxides on the Farmer John present. This was found to be pitchblende. They have continued to sink and to drift on this fissure zone. Practically all of the muck from development is being sold to the AEC depot at Marysvale.

Freedom Claims. The Vanadium Corporation is also developing the Freedom claims of Pratt Seegmiller, which lie east of the Farmer John and northeast of the Prospector group. One occurrence between the Farmer John and the Prospector, which is similar in appearance to the Prospector fissure zone, is being developed by a tunnel and an underground winze. Ores from this development are being

shipped to the AEC depot. The Corporation is also sinking a winze on the Freedom-Farmer John property line 300 ft. east of the Farmer-John open pit to cut the extension of the Farmer John zone of breaking. A strong surface showing makes this a favorable prospect.

Bertelson's. Lane Bertelson operates the Buddy claim lying between the Farmer John and the Prospector groups. A very strong surface exposure of autunite was mined out by him and sold to the AEC. Bertelson is now developing a north-south fissure zone in low grade which appears promising.

Other Prospects. The manner in which individuals and small companies have entered the field is heartening to those mining people who have been worried that the spirit of prospecting was dead. The Hetherly, the Cutler-Coleman-Glenny, and the Homes groups, the Smith-Fulmer partnerships, and the individual men of the district such as John Henry, Shel Dalton, Dave McIntosh and many others, have pitched in with a will. In addition to the men named, the Chief Consolidated Mining Co. and the New Park Mining Co., the largest independent mining companies of the state, are taking an interest in the progress made in the district. No major company other than the Vanadium Corporation is interested.

The Future

What the future has in store for the district depends on the development at depth of the mines now being worked, the success of the many prospectors in the district, and on the economics of uranium. The tunnel being driven under the Farmer John, and the shafts going down on the Freedom and the Prospector claims will tell some of the story. The prime question is "What is ore?" At present a minimum of 0.2% U_3O_8 is acceptable. The AEC states that they desire to hold the grade to over 0.3% U_3O_8. Payment is on the Colorado-Plateau schedule which brings the return on 0.2% to $8.00 per ton, and on 0.3% ore to $15 per ton. Some of the ore delivered has been over 0.5%. A haulage allowance of $0.40 per ton is also paid.

If the Colorado Plateau operators are being paid a fair price for their ores, it seems that those at Marysvale should command a higher price since none of the troublesome (both metallurgically and economically) vanadium is present. The AEC has suggested the possibility of a mill, but has remained silent on the question of probable prices. Also it is now spending an unannounced but considerable amount of money, per pound of uranium produced on the Plateau, in diamond drilling and other types of exploration. If the Marysvale operators received a similar amount of cash per pound produced or the equivalent in aid in diamond drilling or development work, lower grade ores could be mined.

No information as to milling characteristics of the ore or probable costs is available yet, although some work has been done. The size of the orebodies will determine the feasability of a mill. Until the returns from a mill are known, no limit to the size of the orebodies can be set, since they all grade outwardly into ores of lower tenor. Many prospectors report ores of 0.10% or better, which is the minimum acceptable grade on the Plateau.

A comparison can be made with the well-known Eldorado mine at Great Bear Lake, Canada, which is considered to be a major source of supply for our uranium requirements, and which operates under great difficulties within the Arctic Circle. The Canadian Geological Survey Memoir 230 (1945) reports that in 1938, the last year for which figures are available, a crew of 100 men produced 100 tons of ore carrying 25.99 oz. of silver and 1.06% U_3O_8 per ton. Of the silver the mill recovered 55% and of the uranium 73%. This production came from stopes less than 3½ ft. wide. It would seem that any amount of 0.2% ore developed in the wide zones of breaking at Marysvale would compare favorably, provided similar or better mill recoveries could be made.

Uranium Found in Florida Phosphate Limited to Certain Deposits

SMALL AMOUNTS OF URANIUM occur in Florida's land-pebble phosphate deposits, according to J. B. Cathcart, of the U. S. Geological Survey, in a paper presented by permission of the Director of the Survey at the meeting of the Industrial Division of the AIME in Tampa last November.

Land-pebble phosphate, hard-rock phosphate, and river-pebble phosphate are the three types of phosphatic rock found in Florida. Dr. Cathcart's report is concerned primarily with the land-pebble deposits, the only type which contains the uranium. The most productive part of the land-pebble district is in Polk and Hillsborough Counties, in the west-central part of Florida.

In the two counties named, which contain the high-grade part of the land-pebble phosphate district, uranium occurs principally in the Bone Valley formation. Fresh unweathered Hawthorn formation has little or no uranium, but leached Hawthorn, rich in P_2O_5, contains a small amount of uranium. The Pleistocene sands have no uranium except where they contain reworked phosphatic material from the Bone Valley formation.

South of the high-grade district, in Manatee and Hardee Counties, the Bone Valley, Hawthorn, and Pleistocene formations contain only very minor amounts of uranium.

The uranium in the land-pebble deposits was probably syngenetic in origin. The uranium seems to be associated with the phosphate.

Two types of rock in the land-pebble phosphate district contain the uranium. First is the rock composed of sand, clay, and abundant phosphate nodules, termed "matrix." Uranium is present in nodules as proved by analyses of samples from which everything but the phosphate nodules have been removed. In this case it is possible that the uranium takes the place of the calcium in the phosphate mineral. Uranium is also present in the clay fraction (slime). Certain rocks which are composed of clay-size particles and are white and kaolin-like and highly phosphatic, also contain small amounts of uranium. Green "matrix" clays, however, contain almost no phosphate, and little or no uranium.

IN THE CARLSBAD POTASH FIELD, in New Mexico, two rich deposits have been discovered since 1945, suggesting that other finds are possible. Here are the mine surface plant and refinery of Potash Company of America, one of the producers of this area, which is now undertaking a $1-million plant expansion program.

U. S. Reserves of Potash Estimated on Sound Basis

The suggestion is made that the ample figures arrived at are more conservative and more accurate than those claimed for major producing countries abroad. And the industry here is still young.

J. W. TURRENTINE
President Emeritus
American Potash Institute
Washington, D. C.

IN DISCUSSING the potash industry from the viewpoint of its wider or world aspects, it is conventional and logical to introduce the topic of potash reserves. This usually takes the form of a tabulation in which are set down the potash reserves of the various potash-producing countries. These are large figures which, combined, lead to the conclusion that world agriculture has no occasion to worry about the exhaustion of potash supplies.

However, in such tabulations for the various countries little, if any, consideration is given to the bases of the figures used. In the first place, the figures are obviously estimates. Rarely is information available as to the expertness with which these estimates have been derived, whether off-the-cuff guesses or painstaking calculations based on extensive explorations and chemical analyses. It can be stated with fair certainty that few estimates have the latter basis. In the absence of knowledge as to how the estimates are derived, they are obviously not comparable and their inclusion in tabulations is meaningless and misleading.

For example, such tabulations may take the following form:[1]

Estimated World Potash Reserves

(In Million Tons K_2O)

France	300
Germany	2,500
Palestine	1,200
Russia	18,400
Spain	270

United States estimates are omitted from this tabulation for reasons given in the following paragraphs. Before proceeding to consider them, it is pertinent to note what has been stated as to the bases of the estimates mentioned. The French reserves are said to average 14% K_2O; the German 12% K_2O. This implies the inclusion of deposits both above and below the stated average. By contrast, the U. S. Geological Survey, in its estimates of the potash reserves contained in the Permian deposits of New Mexico and Texas, adopted the *minimum* of 14% K_2O content in beds *of not less than* 4 ft. in thickness. The estimate for Palestine is based on the cubical content of the Dead Sea, which, for recovery, implies pumping it dry. As to the Russian estimate, beyond the fact that it is labeled "official" there is little information to permit a clearer definition of what is implied by the large figure given.

Even this meager statement should be enough to show that the estimates tabulated are not comparable and have little reference to what is recoverable economically, as these words are now understood.

In striking contrast are the estimates of the United States potash reserves. In 1945, four major potash-producing companies commissioned Behre, Dolbear & Co., consulting engineers and geologists, to

[1] "Potash in North America" by J. W. Turrentine, p. 49 (A. C. S. Monograph, Reinhold Publishing Co., New York).

make a survey of the potash deposits under development by them, and contributed to it their own records of explorations and analyses. The resulting report was published in 1946 by the American Potash Institute under the title, "Potash Reserves of the United States." What may be said to characterize this report and to place it in a class by itself, particularly in contrast to the foreign reports, is the precision with which the bases of its several alternate estimates are defined. We quote:

"The terms 'economic mineral reserves' or 'ore reserves' are customarily used to designate minerals which can be mined and marketed at a profit. Such a profit must be continuously available, otherwise reserves may be created or obliterated by the economic tide. Increases in cost or decreases in selling price may wipe out economic reserves and, conversely, decreases in cost or higher selling prices may create reserves, while in fact there has been no change in quantity or richness of the deposits themselves.

"In this report we are concerned not only with 'economic reserves' but also with what has come to be known as 'strategic reserves.' While the cost of production cannot be entirely disregarded in 'strategic' material, its production under emergency conditions does not necessarily involve the element of profit. The term 'strategic reserves,' as used herein, includes therefore any potash-bearing material that may in the future be made to yield potash with a reasonable expenditure of labor and material.

Terms Are Defined

"For the purposes of this report the following definitions have been adopted:

"Proved, positive or known reserves are terms generally used interchangeably and in this report are applied to reserves of dissolved (brines) and highly soluble salts, such as sylvite, sufficiently developed to be measurable in areas now in production.

"Probable reserves are extensions of known reserves, the presence of which is supported by reasonable evidence, such as adjacent developed material and geological probabilities of their presence.

"Possible reserves are those extensions of actual exposures which are indicated as reasonably possible in light of available geological or other evidence.

"Potential reserves refer to potash-bearing deposits not in operation but which may be later utilized as a source of potash.

"Recoverable reserves are those portions of reserves which can be recovered as merchantable potash under prevailing economic conditions.

"In this report, the term 'highly soluble salts' is used to designate sylvite, carnallite, langbeinite and other salts of very high solubility.

" 'Soluble salts' as used herein include polyhalite."

Cost and Price Fundamental

These definitions make it clear at the outset that the cost of extracting potash and its sales price are fundamental to the consideration of the subject. Possibly the Soviet Government's Act in issuing such a big estimate results from its lack of regard for the importance of these two factors in the economy of the U. S. S. R. Once cost and price are eliminated from consideration, every potash-bearing raw material, even ocean brine, becomes a potential source.

What are Dolbear's conclusions? On the most accurately definable basis, namely, the extensive surveys of the properties which were being operated in 1945 by the four major potash producers, he estimates "gross reserves" contained at 107 million tons K_2O. Recognizing the improbability of complete recovery due to physical and economic limitations, he calculates a net recovery of 68% to yield 73 million tons K_2O.

This estimate, however, is restricted to those potash beds and brines that are being utilized at present. As is well known, the three operators in the Carlsbad field in New Mexico are concentrating their present efforts on the mining of two potash minerals, sylvite (KCl) and langbeinite (a double salt of potassium and magnesium sulphate), naturally of maximum richness and thickness, leaving undeveloped for the present the other beds of lesser thickness and richness and beds of other salts whose characteristics nevertheless are known through surveys. Dolbear, under the heading of "In Operating Mines But Not in Production in 1945," estimates these beds of potash minerals to contain an additional 251 million tons of K_2O.

The suggestion is ventured that the sum of these two estimates, namely, 107 and 251, or 358 million tons K_2O, is still much more conservative and therefore more accurate than the European estimates tabulated in a foregoing paragraph.

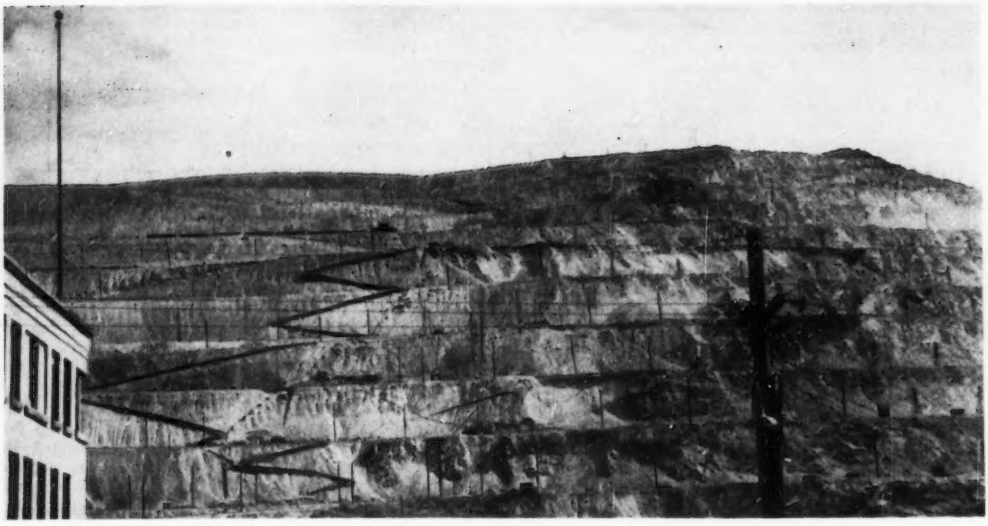
U. S. Industry Still Young

Furthermore, the domestic potash industry is still young. With respect to its major part, the New Mexico development, dating back only about twenty years, has involved surveys that are restricted largely to the immediate holdings of the operators, while it is known that potash deposits occur widely within the Permian Basin underlying a vast area of New Mexico, Texas, and bordering states.

We really know very little as to what we have in the way of potash potentials, even in this area. This is strikingly illustrated by the fact that since Dolbear completed his research in 1945, two new rich deposits have been discovered in the Carlsbad area. One, as announced, contains an estimated 14 million tons of currently exploitable potash ore based on present mining practices. Nothing has been published so far as to the dimensions of the other deposit.

It is idle, therefore, to try to estimate the life of our reserves at present or predicted rates of potash consumption. In addition to the possibility of new discoveries, large-scale research is being conducted by the present industry in all phases of its operations, looking toward increased efficiencies in both mining and refining. This means reduced costs. Included also is research on the utilization of the other potash minerals accessible in the present mines. Thus two of the factors mentioned by Dolbear as capable of increasing the availability of our known reserves are potentially under development through reduction in the cost of extraction and the devising of new techniques for utilizing additional potash minerals.

I have no thought here of trying to belittle the importance of the conservation, based on efficient use, of our essential mineral reserves. But in the case of potash, there can be no question as to the efficient utilization of our reserves, seeing that they are under Federal leases and the supervision of the U. S. Geological Survey. This is particularly true, inasmuch as the potash they yield is in ever-increasing demand by American agriculture. Shortages in supply are currently reported, with no evidence whatever of surpluses in the bins of either producers or retailers.



RADIO ANTENNA at left ties in general mine superintendent's office with moble radio communication system at Kennecott's open-cut copper mine, the largest of its kind in the world, located at Bingham Canyon, Utah.

Mobile Radio System Serves Largest Open-Cut Copper Mine

MOBILE RADIO UNIT in this rail-borne speeder enables mine supervisors and trouble shooters to maintain contact with foreman and with control points.

USE OF RADIO for communication in open-cut mines has been gradually gaining ground throughout the industry. One of the more prominent examples of this progress can be seen at the world's largest open-cut copper mine, the Bingham Canyon pit of the Kennecott Copper Corp. located near Salt Lake City, Utah. Its mobile communication system, installed early in 1949 by the Mountain States Telephone and Telegraph Co., was designed to keep the ore trains rolling, the giant electric shovels gouging out their 10-ton bites of ore, and the whole vast operation of mine running efficiently.

The difficulty of keeping in contact with the various repair and maintenance units constantly moving around the pit may be better understood when it is realized that, within the pit itself, there are about 140 miles of standard-gage railroad trackage. It is scattered over 43 levels, although the pit is only about one mile wide and one and one-half miles long, and has an overall height of 1,850 ft. Previously the mine was equipped with an elaborate telephone system operating out of a PBX served from the Bingham Canyon exchange. This system still serves its limited purpose very well, but the great distances involved and the moving nature of mining operations made a mobile communication system imperative.

All of the towers for power transmission lines and trolley wires are portable, as the tracks are constantly being shifted as each successive "cut" is completed across a level. Thus, each time room for an additional level is made at the topmost level, this "space" moves downward from level to level until a new

sub-pit level is established. The levels average 67 ft. in height and are from 70 to 250 ft. wide. To facilitate shifting the 5,000-volt power lines, rapid communication with repair and maintenance trains carrying electrical and mechanical crews is essential.

Instant two-way communication from any point in the mine has worked to the great advantage of the company. In case of accident or machinery breakdown, there is no time delay before relief can be summoned, such as occurred in the past when at times great distances had to be traveled to communication points. That dispatchers and supervisory personnel can obtain immediate contact with locomotives and trains throughout the mine from either base stations or other mobile units is indeed of great value for routing and notification purposes.

Base Stations Dispersed

Five base stations are now in service, working with nine mobile units. Base stations are located at the mine office, the general mine foreman's pit shack perched high on a ledge overlooking the mine, and at three principal control points along the mine trackage. The station in the mine foreman's shack is moved from time to time as mining operations make it necessary. Six mobile units have been installed on electric locomotives, one on the mine superintendent's automobile, and two on gasoline speeders, locally known as "China Clippers," which cruise the pit carrying trouble shooters and supervisory personnel. The locomotives carrying mobile units are primarily those powering repair and maintenance trains.

Mobile units are equipped with a radio transmitter and receiver. The receiver is normally connected to the antenna and is energized at all times. Its output is fed into a loud speaker. A hand set in the mobile unit is so connected that, when it is removed from its cradle, the loud speaker is silenced and the output of the radio receiver is fed into the hand-set receiver. The hand-set transmitter is connected to the radio transmitter. A push button is provided on the hand-set handle and is so arranged that, when pushed, it disconnects the radio receiver and connects the radio transmitter to the antenna, at the same time turning on the radio transmitter. Equipment at a base station is similar in operation to the mobile radio units described above.

ONE OF THE BASE STATIONS. This is the centralized traffic control board, located at a rail junction point. It keeps in touch with all locomotives.

LOCOMOTIVE ENGINEER receives routing instructions over the mobile communication system. Hand set is operated on a "push-to-talk" procedure.

Increased Output Marks Silver Camp Revival

SILVER PRODUCTION is rising in the Cobalt-Gowganda area of Ontario, Can. While still small, the volume of money going into prospect work is growing. The camp currently has four mills in operation; the most recent was acquired in July by Cobalt Lode. A fifth, Castle-Trethe-way, may be operating by the end of the year. Add these to Siscoe Metals, Silver Miller and Silanco, and one can predict record silver production levels for many years.

Siscoe Metals is at the top of the list in production figures. Hopes are that it will produce one million ounces of silver this year. June production totaled 80,280 oz. from 1,456 tons, an average grade of 55.14 oz. This output is well below the over-all 1950 rate, due to mill repairs made in June.

Silver Miller's production for June was 146,332 oz. Monthly output for Silanco has run about 27,000 oz. Its Colonial mill has been treating ore from the Beaver and Temiskaming mines. Initial capacity of the new Cobalt Lode mill is 50 tons daily. This installation will reduce marketing, smelting and royalty charges, heavy bites into income.

Random Transit Setup Method Saves Time, Eliminates Taping

DANIEL SHEWMON Mining Instructor
West Virginia Institute of Technology

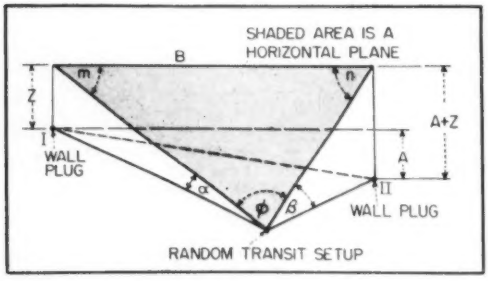
THE RANDOM TRANSIT SETUP described here does not require taping to known stations. If, for instance, a transitman must make a setup in a large open stope, glory hole, or open-pit position where it is very difficult or impossible to tape to known observable stations, he may determine the transit location by shooting both known stations to determine the interior angle and recording the vertical angles to both stations. The transit location and bearing can be calculated as shown in the accompanying example.

This method will prove very useful for the transitman who is stationed at the bottom of a stope which has been sunk away from two wall plugs, both inaccessible for taping. With the aid of a good spotlight, wall plugs projecting a few inches from the pillar wall can be seen and accurately split for distances more than 200 ft. in fairly clear air. If the auxiliary scope must be used for steep angles, it should be mounted on the side of the transit for true vertical angles. A plunged double-angle right or interior angle taken and halved will eliminate side-scope calculations.

There will be no taping errors, and with good plug locations and a transit in good adjustment, accuracy as good or better than by taping methods can be obtained.

Here's an Example

The following tapeless random setup was actually made underground. Random wall plugs were placed opposite each other, in the pillar walls of a stope 70 ft. wide, from a located stake in the middle of the stope. The coordinates of the plugs were calculated and the horizontal and vertical distances between the two ascertained. Using these distances, the angle between the plugs and the two original vertical angles, the location of the transit was recalculated as shown in the accompanying example. The bearing error was one minute and the horizontal error, 0.02 ft. This is well within the accuracy desired in stope work.



RANDOM TRANSIT SETUP

Conditions of the Problem:

I and II are known points below transit
A and B are known vertical and horizontal distances between I and II
α and β are vertical angles to I and II, respectively.
ϕ is the horizontal angle between I and II
Z is the vertical distance from transit to I
m and n are horizontal angles from line I-II to transit.
x and y are horizontal distances between transit and I and II, respectively.
I and II are inaccessible wall plugs.

Given: $B = 62.67$ ft. $\quad A = 0.29$ ft.
$\phi = 133° 14'$ $\quad \alpha = -8° 59'$ $\quad \beta = -11° 58'$
$\sin \phi = +0.72857$ $\quad \cos \phi = -0.68497$
$\tan \alpha = +0.15809$ $\quad \tan \beta = +0.21195$

To find: Bearing, distance, and difference in elevation from I to transit.

Basic Formula:

1) $Z = X \tan \alpha$

2) $A + Z = Y \tan \beta$

3) $\dfrac{B}{\sin \phi} = \dfrac{X}{\sin n} = \dfrac{Y}{\sin m}$

$A + X \tan \alpha = Y \tan \beta$

$A + \dfrac{B \sin n \tan \alpha}{\sin \phi} = \dfrac{B \sin m \tan \beta}{\sin \phi}$

$\dfrac{A \sin \phi}{B} + \sin n \tan \alpha = \sin m \tan \beta$

Since, $\sin m = \sin [180 - (\phi + n)]$
$\sin m = \sin (\phi + n)$

$\dfrac{A \sin \phi}{B} + \sin n \tan \alpha = \sin (\phi + n) \tan \beta$

$\dfrac{A \sin \phi}{B} = (\sin \phi \cos n + \cos \phi \sin n) \tan \beta - \sin n \tan \alpha$

$= \cos n \sin \phi \tan \beta + \sin n \cos \phi \tan \beta - \sin n \tan \alpha$
$= \cos n \sin \phi \tan \beta + \sin n (\cos \phi \tan \beta - \tan \alpha)$

$\dfrac{A \sin \phi}{B} = \cos n \sin \phi \tan \beta + \sin n (\cos \phi \tan \beta - \tan \alpha)$

$\dfrac{A \sin \phi}{B} = \cos n (\sin 133° 14') \tan 11° 58')$
$+ \sin n [\cos 133° 14' (\tan 11° 58') - \tan 8° 59']$

$\dfrac{(0.29)(0.72857)}{62.67} = (.72857)(.21195) \cos n$
$+ [(-.68497)(.21195) - .15809] \sin n$

$0.0033715 = 0.15442 \cos n + [-0.14518 - 0.15809] \sin n$

$[0.30327 \sin n + 0.0033714 = 0.15442 \cos n]^2$

$0.091973 \sin^2 n + 0.0020449 \sin n + 0.000011366 =$
$0.023846 \cos^2 n$
$= 0.23846 - 0.023846 \sin^2 n$

$0.115819 \sin^2 n + 0.0020449 \sin n - 0.023835 = 0$
(a) (b) (c)

$\sin n = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a} =$

$\dfrac{-0.0020449 \pm \sqrt{(0.0020449)^2 - 4(0.115819)(-0.023835}}{2(0.115819)}$

$\sin n = 0.44489$ and $n = 26° 25'$

$m + n + \phi = 180° = m + 26° 25' + 133° 14'$
$m = 20° 21'$

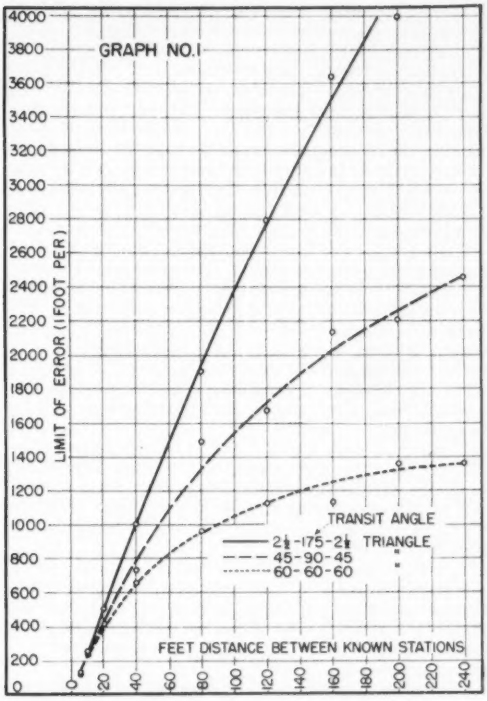
$\dfrac{B}{\sin \phi} = \dfrac{X}{\sin n} = \dfrac{62.67}{.72857} = \dfrac{X}{.44489}$

$X = 38.27$ = horizontal distance from I to transit

Bearing I to II = S 31° 40' W
angle $m = 20° 21'$
Bearing I to transit = S 52° 01' W

$\dfrac{Z}{X} \tan \alpha = \dfrac{Z}{38.27} = 0.15809$ $\qquad Z = 6.05$ ft.

How Accuracy of Random Setup Varies With Triangle Shape



Relation between limit of error and distance between known stations for three different triangles, when transit error is 1 min., and tape error is 0.02 ft. Note that 2½-175-2½° triangle offers greatest accuracy. For 120-ft. distance between stations, limit of error for 2½-175-2½° trinangle is 1 ft. per 2,800 as compared with 1 ft. per 1120 ft. for the 60-60-60° triangle.

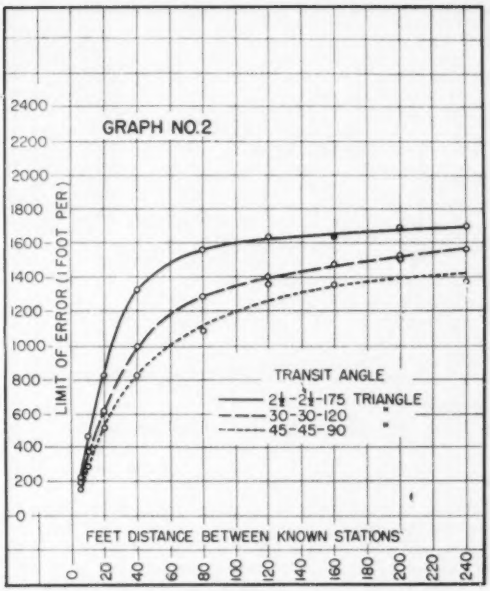
Three Variations

This type problem can be divided into three categories, each with a formula similar in appearance except for sign, as shown below.

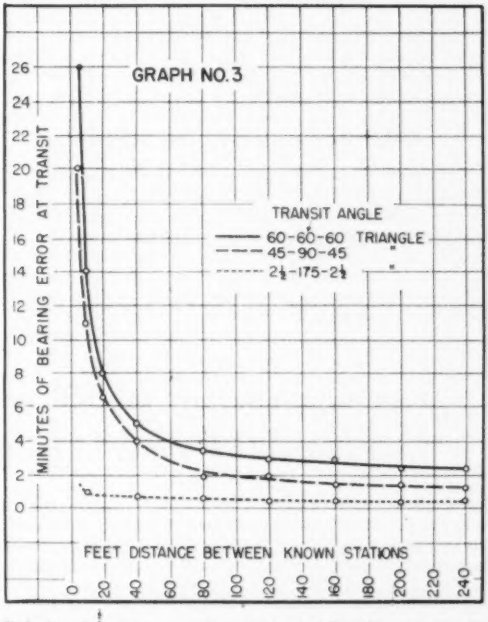
vertical angle α		β	Formulas
$\pm$	$<$	$\pm$	1. $A \sin \phi = \cos n \sin \phi \tan \beta + \frac{B}{\sin n (\cos \phi \tan \beta - \tan \alpha)}$
$\pm$	$>$	$\pm$	2. $A \sin \phi = -\cos n \sin \phi \tan \beta + \frac{B}{\sin n (\cos \phi \tan \beta + \tan \alpha)}$
$\mp$		$\pm$	3. $A \sin \phi = \cos n \sin \phi \tan \beta + \frac{B}{\sin n (\cos \phi \tan \beta + \tan \alpha)}$

Thus if α is plus and β is minus, formula No. 3 is used, or if α and β both have the same sign but α is larger than β, then formula No. 2 is used.

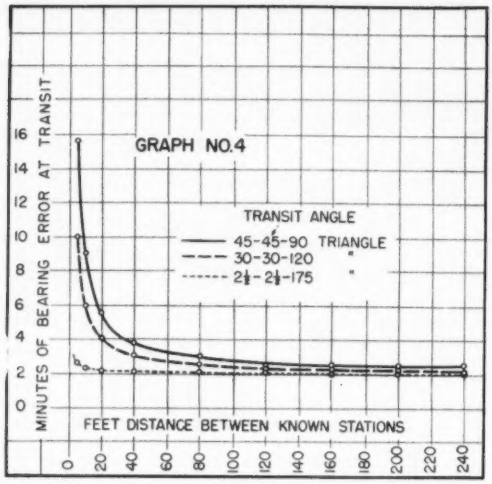
The calculations with practice take less than an hour. Aside from checking the coordinates of the



Relation between limit of error and distance between known stations for three different triangles, when transit error is 1 min., and tape error is 0.02 ft. Note that the 2½-2½-175° triangle offers greater accuracy than the 45-45-90° triangle.



Relation between error in minutes of bearing at transit and distance between known stations, when transit error is 1 min., and tape error is 0.02 ft. Note that bearing error is much less for the 2½-175-2½° triangle than for the 60-60-60° triangle.



Relation between error in minutes of bearing at transit and distance between known stations, when transit error is 1 min., and tape error is 0.02 ft. Note that bearing error is less for the 2½-2½-175° triangle than for the 45-45-90° triangle.

transit, only the original formula should be checked and the solution tried in the formula for a final check. Total time for calculations is about one and one-half man-hours. The field time for the setup is about three minutes. This is a small fraction of the total man-hours spent in running a new traverse, and then calculating and checking it. It also allows fewer surveys in stope sinking on regular pillars, without losing the control in the stope itself.

Other Applications of This Method

This random setup method can also be applied in shooting two nearby triangulation stations or other located objects, and will give location to a transit with accuracy matching the accuracy of the original known points, and the inherent accuracy of the transit itself. The only other immediate limit to this accuracy is the earth's curvature and refraction which causes an error of 0.02 ft. elevation per 1,000 ft., or 0.57 ft. per mile.

How Accurate Are Random Setup Methods?

Speaking of random setups in general, not just the method described above, it should be noted that transit men are occasionally prohibited from using random setups because a superior believes them to be too inaccurate. Actually, a random setup can be made with almost any accuracy desired up to 1 ft. in 4,000 ft. through the use of strong triangles with four or five significant figures in the sides. The only limiting factor is the original accuracy of the known stations, making the reasonable assumption that the angle right turned between the known stations is accurate to plus or minus 1 min., and that the taping error does not exceed 0.02 ft. A good transit crew with good equipment can easily do much better than this.

Four graphs are illustrated which show the relative accuracy of different shaped triangles with the distance between known stations varying from 5 to 240 ft., and with the interior angle in error by 1 min., and with a taping error of 0.02 ft. Irregularity of the curves is due to inaccuracy of interpolation of the sines of the calculated angle of the triangle, and the sines and cosines in computing the latitudes and departures used in calculation of the limit of error. Five-place tables were used.

The curves indicate that for angular accuracy, the triangle with two very small and one very large angle is by far the most accurate, especially if the transit can be placed between two known stations. That is why the Weisbach triangle for shaft plumbing is popular.

In the graph on limit of error (or the distance which the measured leg of the triangle can be projected before accumulating a 1-ft. error) it is apparent that the flatter the triangle for the same distances between known stations, the more accurate is the random transit setup located.

Of course, accuracy of any survey started by a random setup depends on both the errors in transit location caused by the limit of error of the calculated triangle, the actual angular error of the triangle itself, and the accuracy in locating the two known stations. Angular accuracy as seen in the graph can be surprisingly low when using triangles in which the sum or difference between the sides adjacent to the random setup approaches the length of the third side. It is a common assumption that for random setup work a 60-60-60 triangle is stronger than any other shaped triangle. In reality, it is the least accurate both in limit of error in the triangle and in angular error, as can be seen in the graphs.

Aluminum Therapy for Silicosis Shows Favorable Results in Canada

CONDITIONS THROUGHOUT CANADA regarding preventative treatment for silicosis and the therapeutic treatment continue to show favorable results, according to the 1949 annual report of McIntyre Research Foundation, Schumacher, Ont. Reports from mine managers support the statements of the examining doctors that few, if any, new cases are developing in the industry.

In the provinces where therapeutic or individual treatments are being administered, the same symptomatic improvement continues to be noted in a large majority of those treated.

Of significant import is the fact that the Compensation Board of British Columbia has reduced the silicosis assessment rate for the mines of the province from 6% to 5½% in 1948, and in 1949 from 5½% to 3½%. The inference is that such a reduction in the assessment rate is made possible by the decreased incidence of silicosis in the province. No way exists at present to determine the degree by which the reduction in incidence can be ascribed to improved mining methods, ventilation and dust control or to aluminum therapy. It would appear, however, that the combination of all methods that have been developed is having the desired effect of gradually eliminating this industrial disease in the mines of British Columbia.

KEEPING TAB ON PRACTICE

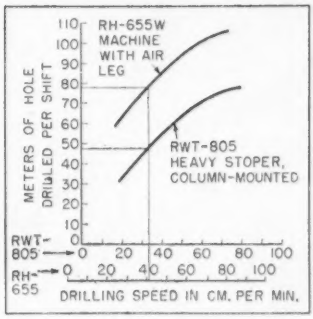
Carbide-Tipped Jumper Drills in Sweden. Erik Ryd, of A. B. Atlas Diesel, Stockholm, while in the United States recently, discussed the use of carbide-tipped jumper drills in Swedish mines. Practically all drilling (with only a few exceptions) in these mines is done with the hard-metal-tipped jumpers. The amount of hole totals approximately 10 million meters annually. The effect on the drill runner has been good. The men like the tipped steels, the work is easier, and they earn more, thus sharing the advantages.

The steels are closely standardized and are usually made in the following sizes with respect to jumper length and size of bit: 800 mm. length, 34 mm. bit size; 1,600 mm. length, 33 mm.; 2,400 mm. length, 32 mm.; 3,200 mm. length, 31 mm.; and 4,000 mm. length, 30 mm. The size of steel is equivalent to ⅞-in. hex., and shank length to 4¼ in. The rock drill most used with these steels is the company's Type RH 655W drill, weighing 19 kg., having 65-mm. piston diameter, and using air at 90 psi. Before these machines were adopted, stoper drills were usually employed, weighing 45 to 52 kg. and having a piston diameter of 70 to 80 mm.

Composition of the steel used in the jumper drills is, in general, carbon 1%, chromium 0.8%, manganese 0.8%, and molybdenum 0.4%.

The carbide insert, brazed in a slot in the single-edge chisel-type bit, contains 11% cobalt, the rest being tungsten carbide.

Using the equipment described, net drilling speed has been increased slightly, but the over-all footage per hour is considerably more. The advantages of using the tipped steel will be reflected in the cost of the work done, according to Mr. Ryd. The way in which the various factors assert themselves depends largely on the nature of the job. In mining, where there is a shortage of labor, the increase in production per working hour may give a larger margin for covering fixed costs in connection with both mine and mill. Also the amount of air (power) consumed in drilling will drop to about 70% of that previously recorded, as at Boliden (see cut). In the graph, the vertical line shown represents the qualities of the rock drilled. The drilling capacities of the drills can then be read from the scale along the horizontal axis. If horizontal lines are



COMPARISON of meters drilled per shift by heavy column-mounted stoper using ordinary drill steel, with meters drilled per shift with light, air-leg-mounted machine using hard-metal-tipped steel.

then drawn as shown, the meters-drilled-per-shift can be read from the vertical axis.

Life obtained for the jumpers in Sweden, in terms of total length of hole drilled, is 80 to 120 meters in granite and up to 500 meters in ore. Some success has been had in making a jumper with insert and steel of nearly equal life. A jumper and insert used to failure has no salvage value.

It is desirable to instruct a man who is using for the first time the equipment described. Steels must be handled carefully and reground properly. Proper handling of the machines must also be learned.

Outside of Sweden, carbide-tipped jumpers are being used extensively in Switzerland, France, Norway, and to an increasing extent in Canada, according to Mr. Ryd. In South Africa, they have been used especially in shaft sinking and in drifting.

Again the British Diesel Mine Locomotive. North British Locomotive Co., Ltd., Glasgow, Scotland, is the third British manufacturer of diesel locomotives for underground mine service to exhibit an interest recently in the potentialities of the United States mining market by sending a representative to investigate.

J. B. McAuslan is in New York at the time of writing. Literature describing his company's product features a 100-hp. flameproof unit, available in 30-in., 36-in. and 42-in. gages. Maximum over-all height is 4 ft. 5 in., width 4 ft. and over-all length 15 ft. 1 in. The locomotive will haul 100 tons at 15 mph. up to 400 tons at 3 mph., on the level. Exhaust gases are also fully conditioned and filtered. Although this unit is intended for coal mine service, the fact that it is being offered here will be further evidence for the mining industry in general as to the actualities of diesel haulage underground.

New Practice, New Hazards. Canadian Copco, Ltd., Kirkland Lake, Ont., warns that certain hazards are inherent to drilling with a pneumatic pusher or jackleg. They are:

1, Steel breakage—(a) Don't place hand on underside of drill handle. (b) Stand behind short hoses from lubricator to drill. (c) Don't "ride" the drill. (d) Let no one stand in front of it. If the steel breaks, injury may result.

2, Drilling loose—Don't straddle the pusher. If the rock falls, the pusher will injure the driller.

3, Method of drilling—(a) Keep drill-steel retainer in place on steel at all times, especially when collaring. (b) Don't leave steels in drill holes, like "porcupine quills."

Details are given in a bulletin for safety engineers and supervisors.

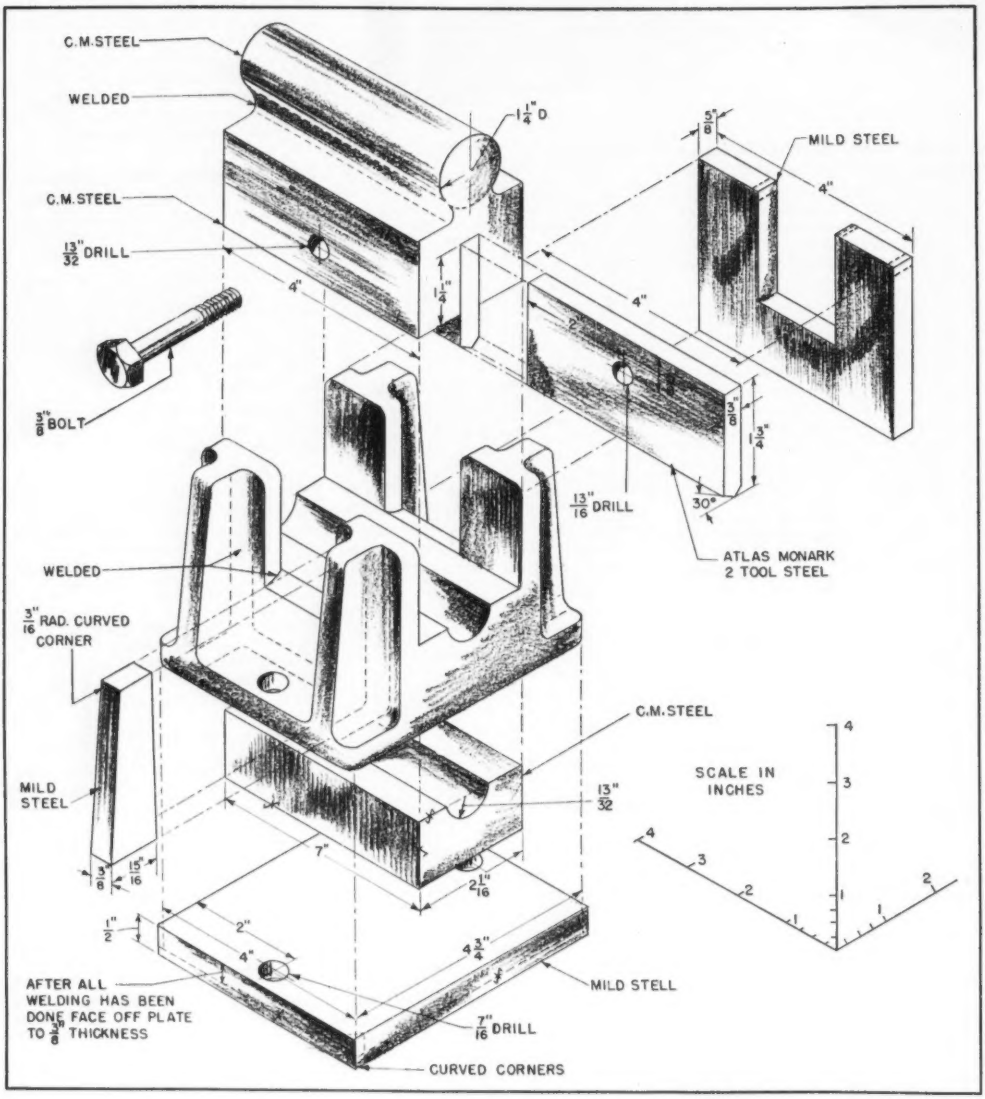
Shaped Charge at Miami. "Cone bombs," so-called locally because of cone-shaped depression on one end which directs the explosive force, are used in Miami Copper Co.'s mine, Miami, Ariz., to blast "hung" raises and chutes and for bulldozing boulders, according to Bureau of Mines Information Circular 7567, May, 1950. These bombs are 3x4½-in. cartridges of 40% semi-gelatin dynamite. They are fired by inserting an electric detonator in the side about 1 in. from the end opposite the depression. The bomb is held in position by a pole when blasting a raise or chute.

Diesel Locomotives Haul Nine Cars Per Trip. The two diesel mine locomotives at Great Western Sugar Co.'s limestone mine, Horse Creek, Wyo., (*E&MJ*, July, 1950, page 82) are hauling 9 cars, or 43 tons, per trip, over an average distance of 4,300 ft. from loading chute to crushing plant, according to J. W. Dudgeon, limestone manager. They are 4-ton and 5-ton units respectively.

Gases are passed through exhaust conditioners before being discharged into the mine air underground. Ventilation is both natural and forced.

Both locomotives are giving good service. The 5-ton unit is equipped with a fluid coupling and is down for repairs less than the 4-ton unit. The latter has troubles with its clutches more frequently.

OPERATING IDEAS



Handy Core-Splitter Is Easy to Make

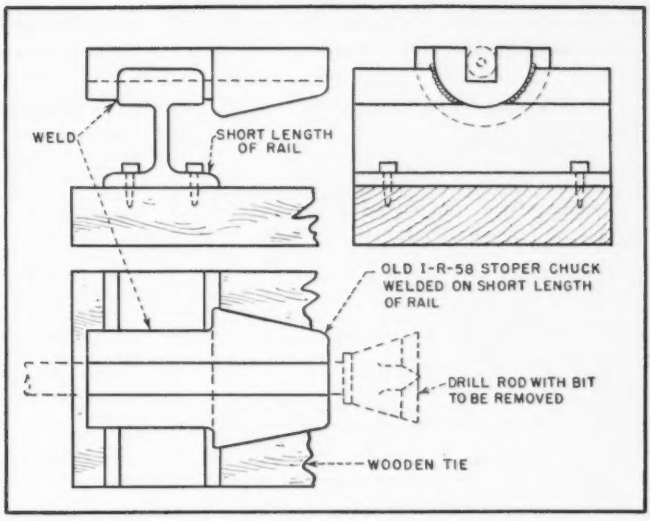
Splitting cores cleanly is no problem for geologists at the Golden Manitou mine in Quebec, Canada, nor for their neighbors in the Val d'Or district. They use a splitter of their own design (above) which is not only easy to make, but is light and portable.

Simply place the core in the half-round formed in the base and slide the block holding the cutting edge down on top of it. A healthy tap with an 8-lb. mall will do the rest.

The cutting edge is made of Atlas Monark tool steel and is easily removed for reconditioning by the removal of one bolt.

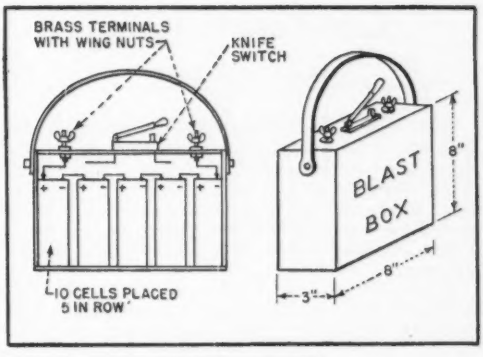
Handy Bit Remover

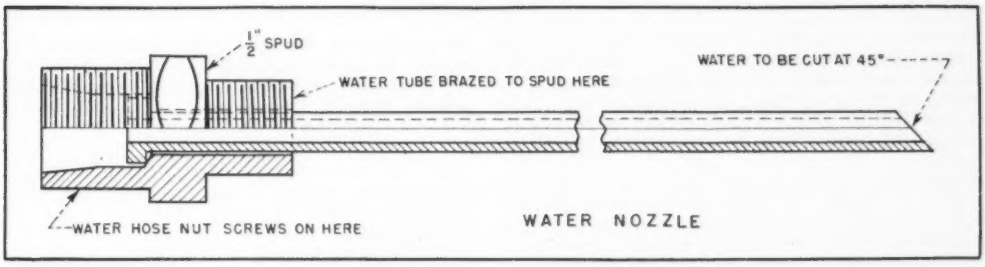
Elmer Snell, mine superintendent, Copper Canyon Mining Co., Battle Mountain, Nevada, suggests this simple, inexpensive, yet effective bit remover for use in drifts, crosscuts, and tunnels, and in stopes where long-hole drilling is done. It has given excellent service at the Copper Canyon property, where bits of the Throwaway and Liddicoat type are being removed from the drill rods in record time. The device consists of an old I-R 58 stoper chuck planed down to size shown and welded on to a short piece of heavy rail. In the drift or stope, the complete bit assembly is bolted to one end of a wooden tie, on the opposite end of which rests the foot of the drill column. Thus the bit remover is always handy.



Useful Electric Blasting Box

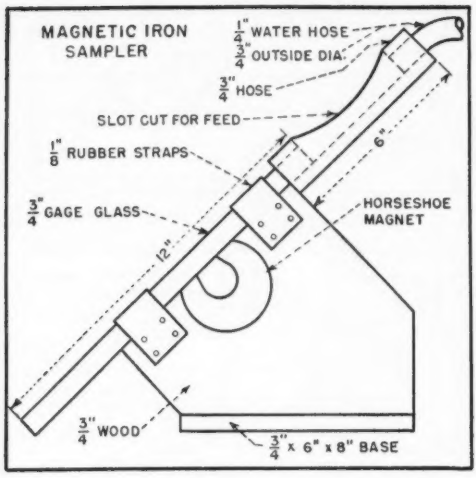
The simple blasting box shown in the accompanying sketch was designed and constructed by E. J. Farley, electrician, and has given good service at the property of Copper Canyon Mining Co., Nevada. Discarded old cells from Edison electric cap lamp batteries are used. About 10 of these cells connected in series will give 14 v. and about 30 amp. These are housed in a wooden box 8½ in. long, 3 in. wide, and 8 in. high. A strap facilitates carrying the unit. On the cover or lid are mounted two brass terminals with brass wing nuts and a single-pole knife switch. The box is painted white, with "Blast Box" painted in large red letters on each side. An 8-hr. charge at a 2-amp. rate will last several months.





Nozzle for Washing Down Working Faces

Time required to wash down walls in preparation for underground geological mapping can be cut down considerably with this handy nozzle, according to Campbell Fox of Duparquet, Quebec. The nozzle was built and used at Consolidated Beattie Gold Mines, Ltd. after water pressure in the mine had been reduced to prevent breakage of water hoses used for drilling purposes. Materials used to make the nozzle include a piece of standard water tube for rock drills 6 to 8 in. long, and a ½-in. male spud. The water tube is inserted into the spud and brazed to it as illustrated above. The spud is part of a standard water hose coupling available at practically all mine warehouses.



Magnetic Iron Sampler

The illustrated magnetic iron sampler fills a long-felt need for a quick method of checking magnetic tails in an iron concentrating plant, according to W. A. Vickers, Wanakena, N. Y., who describes and illustrates this device. He outlines operating procedure as follows

"For a tail check, there is no need to dry or weigh the sample. Merely pick up a spoonful of the wet sample and drop it through the slot cut into the tube. If there is no iron present, nothing will be stopped by the magnet. But if iron is present, the particles will be held by the magnet, and one knows that something is wrong with the concentrator.

"To clean out the iron, one merely pulls up the glass tube about four inches, and then pushes it down again. The machine is then clean.

"For prospecting work, the grade of ore can be estimated fairly accurately if a comparison is made between a sample of known value and the unknown. In both cases the samples should be dried, and screened to at least minus 20 mesh."

Short-Center V-Belt Drives Cost Less to Install

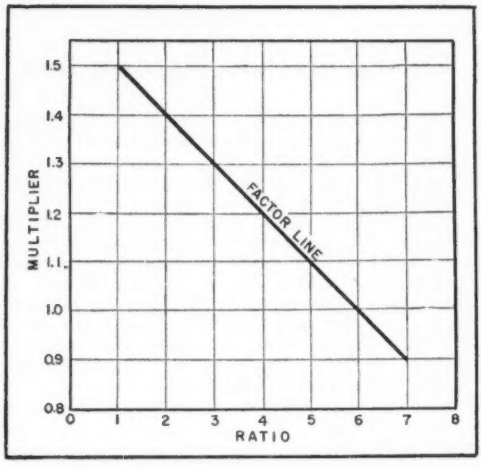
FRANK H. RUMBLE[1]

Short-center V-belts cost less on an initial installation, are easier to maintain and cost less to replace. All of these advantages can be gained without sacrificing efficiency or violating principles of good design. Consequently the important question is "How should the distance between centers of sheaves in V-belt installations be determined?" The answer follows:

In practice, the center distance—distance between shafts—of a V-belt drive may be comparatively long or it may be as short as the diameters will allow without the sheaves actually touching. Experience has shown that the *shortest practicable center distance is the sum of the radii of the sheaves plus enough margin to enable the sheaves to be moved toward each other sufficiently for installing or changing belts.* A margin ranging from several inches on fractional horsepower drives to several feet on large multiple drives may be sufficient for this purpose. However, because the designer may not always find it possible or desirable to use the very shortest center distance, he is given some leeway.

Arc of contact of the belts on the sheaves must be taken into account to obtain the best drive with the fewest number of belts. For greatest efficiency, the arc on the smaller sheave should never be less than 90 deg. Taking all these factors into consideration, V-belt drive engineers are agreed that generally the ideal distance of the drive, up to 7 to 1 ratio, is from 1 to 1½ times the diameter of the larger sheave. On larger ratio drives, the center distances may be slightly less than the diameter of the large sheave.

The accompanying graph shows how to determine the ideal center distance proportionately. For example, assume that the diameter of the driven sheave is 30 in. Obviously if the diameter of the driver sheave is also



How to determine ideal center distance: Locate ratio on baseline and trace imaginary line vertically to factor line, then horizontally to multiplier scale on left-hand margin of chart. Multiplier times diameter of large sheave equals ideal center distance.

30 in., the center distance of the drive must be considerably more than 30 in.—the sum of the radii of the sheaves alone is 30 in., and in that space they could not be belted.

Note however that for the 1 to 1 ratio drives, the rule allows a center distance of 1½ times the diameter of the driven sheave. In this case the ideal center distance would be 45 in. If the diameter of the smaller or driver sheave is 5 in., a 6 to 1 ratio drive, a multiplier of 1.0 times the diameter of the driven sheave shows the ideal center distance to be 30 in.

Manufacturers of V-belts have standardized on a considerable number of lengths in five standard belt sizes—A, B, C, D and E sections. These enable the engineer to design any drive with a center distance as near the ideal as possible.

[1]Texrope Drive Dept., Allis-Chalmers Mfg. Co.

MARKETS—Trends and Prices (*Continued from page* 69)

Summary of Copper Statistics

Following is a summary of the most recent copper statistics reported by members of the Copper Institute, figures in tons:

UNITED STATES

Production:	Jan.	Feb.	March	April	(a) May	June
Crude, primary	73,625	69,994	78,928	73,853	76,691	78,394
Crude, secondary	12,001	10,762	11,407	9,929	6,571	17,940
Totals	85,626	80,756	90,335	83,782	83,262	96,334
Refined	95,229	94,036	113,440	103,293	112,388	113,961
Deliveries, refined	111,668	112,773	123,030	101,729	113,837	126,047
Stock at end, refined...	101,070	77,472	60,276	57,028	51,020	50,327

OUTSIDE UNITED STATES

Production:	Jan.	Feb.	March	April	(a) May	June
Crude, primary	106,162	110,089	108,588	105,065	117,691	106,304
Crude, secondary	1,669	549	1,227	1,004	758	1,616
Totals	107,831	110,638	109,815	106,069	118,449	107,920
Refined	87,923	83,501	84,604	89,369	98,082	91,145
Deliveries, refined	81,574	69,193	72,626	72,047	83,305	64,565
Stock at end, refined...	142,971	144,893	148,455	150,444	144,650	136,483

(a) Corrected figures.

Official London Prices

The British Ministry of Supply continues to fix delivered prices of copper, lead and zinc for the United Kingdom. Quotations in effect as July ended were as follows:

	Per Long Ton £	s.	d.
COPPER:			
Electrolytic, high conductivity....	186	0	0
Fire refined, high conductivity.....	186	0	0
Fire refined, high grade.....	185	10	0
Fire refined, min. 99.7 percent.....	185	0	0
Fire refined, min. 99.2 percent.....	184	10	0
LEAD:			
Soft, foreign duty paid.....	96	0	0
Soft, Empire	96	0	0
English, refined	97	10	0
ZINC:			
Foreign (G.o.b.) duty paid.....	127	10	0
Domestic (G.o.b.) duty paid.....	127	10	0
Prime Western and debased.....	127	10	0
Refined and electrolytic.....	132	0	0
Minimum 99.99 percent.....	138	0	0

Miscellaneous Metals, Ores, Minerals

Quotations cover wholesale lots, prompt shipment, f.o.b. New York unless otherwise stated

MISCELLANEOUS METALS

(July 31, 1950)

Aluminum, ingot, 99 plus percent, lb. (base price)...	17½c.
Antimony, spot, lb., 5 tons and up but less than carload in cases	27.75¢
Bismuth, ton lots, lb.	$2.00
Cadmium, commercial sticks, delivered, lb.....	$2.15
Calcium, 1 lb., ton lots, 98 percent, cast	$2.05
Chromium, 97 percent grade, lb., contract	$1.07
Cobalt, 97 to 99 percent, per lb.	$1.80
Indium, troy oz.	$2.25
Nickel, cathodes, lb., f.o.b. Port Colborne (a).....	48c.
Magnesium, 99.8 per cent, carloads, lb., producer's plant, Freeport, Texas.....	22½c.
Palladium, troy oz.	$24.00
Platinum (Official quotation wholesale lots) troy oz...	$74.00
Quicksilver, flask of 76 lbs., 25 flasks or more.....	$78.00
Selenium, 99.5 percent, lb.....	$2.25
Silicon, minimum 97 percent, spot, carloads, lb.....	16.50c.
Tellurium, lb.	$1.75 nom.
Thallium, 100 lb. or more, lb.	$12.50
Titanium, 96 to 98 percent, lb.	$5.00

(a) Includes U. S. duty

METALLIC ORES

Beryllium Ore, imported, 10 to 12% BeO, per unit....	$26.00
Chrome Ore, per long ton, f.o.b. cars Atl. ports, dry 48% Cr_2O_3, no ratio	$17.30@$18.30
48% Cr_2O_3, 3 to 1 ratio.....	$35.00@$38.00
Iron Ore, Lake Superior, Lower Lake ports, long ton: Old Range bessemer	$8.10
Mesabi bessemer	$7.85
Old Range non-bessemer	$7.95
Mesabi, non-bessemer	$7.70
Lead (Galena), 80 percent, Joplin, Mo., ton.....	$147.67
Manganese Ore—Per long ton unit of Mn basis 48 percent manganese, nearby positions, subject to premiums and penalties, 74 @ 78c., c.i.f. U. S. ports, duty extra. Long-term contract prices nominal.	
Molybdenum Ore, 90%, per lb. of MoS_2 f.o.b. mines..	54c.
Tantalite, 60% concentrate, per lb.	$2.00@$2.75
Tungsten Ore, per unit of WO_3 Foreign, 60 percent, duty paid.....	$24.00@$24.50
Domestic, scheelite, 60 percent and upward.....	$28.50
Vanadium Ore, per lb. of contained V_2O_5 f.o.b. mines	27½c.
Zinc Ore, Prime, 40 percent concentrate, Joplin, Mo. per ton	$99.00

METALLIC COMPOUNDS

Arsenious Oxide (arsenic trioxide) lb., in bbl. carload lots delivered	5½c.
Cobalt Oxide, 72%, metallurgical grade, per lb. of Co	$1.95
Copper Sulphate, 100 lb.....	$8.10

ALLOYS

Beryllium Copper, 4 percent Be, per lb. of contained Be, 5 lb. or more of Be.....	$30.00
Ferrochrome, 65 to 69 percent, per lb. of Cr contained	20.50c.
Ferromanganese, 78 to 82 percent, gross ton, seaboard	$172.00
Ferromolybdenum, 55 to 65 percent Mo, lb. of Mo, contained	$1.13
Ferrosilicon, 50 percent, per lb. of contained Si.....	11.3c.
Ferrotungsten, 75 to 80 percent, lb. of W contained..	$2.75
Ferrovanadium, per lb. of V delivered.....	$2.50
Silicomanganese, 1½ percent C, per lb. contracts.....	8.95c.
Spiegeleisen, per long ton, 19@21%.....	$66.00

NON-METALLIC MINERALS

Asbestos, f.o.b. Canada (Quebec) mines (U. S. funds), ton: Crude No. 1	$960@$1,050
Crude No. 2	$492@$550
Spinning fibers	$322@$475
Shingle fibers	$95.50@$141
Paper stock	$78.50@$88
Waste	$58
Shorts	$27@$52
Vermont, f.o.b. Hyde Park: Shingle stock	$97.00@$107.00
Paper stock	$68.50@$85.00
Waste	$51.00
Refuse or shorts	$25.50@$46.50
Barytes, f.o.b. mines: Georgia, crude, per long ton.....	$11.50@$12.00
Missouri, 93 to 94 percent $BaSO_4$, per short ton	$9.00@$9.50
Bauxite, long ton, f.o.b. point of shipment: Domestic, crude, 50 to 52 percent (not dried).....	$4.00@$5.60
Domestic, chemical, 55 to 58 percent.....	(a)$8.50@$9.50
Domestic, abrasive, 86 to 84 percent.....	$18.00@$18.50
China Clay, f.o.b. mines, ton: South Carolina and Georgia, No. 1, airfloated bulk..	$8.50@$9.50
North Carolina ceramic grade.....	$20.25@$22.25
Feldspar, bulk ton: Potash or soda feldspar, 200 mesh, ceramic grade..	$19.50@$22.25
Glass spar, white, 20 mesh.....	$11.75@$12.50
Fluorspar, f.o.b. mines, bulk, Kentucky and Illinois, 70% effective, CaF_2, ton	$37.00
Acid 97% concentrate, bulk, ton.....	$43.50
Fuller's earth, f.o.b. Georgia or Florida, ton.....	$7.00@$14.00
Magnesite, per ton dead-burned, bulk, f.o.b. Washington	$33.00
Mica—Domestic f.o.b. mines. Punch, 12 to 22c. per lb. according to size and quality. Sheet, clear, 1½ x 2 inch, 70 to 75c.; 2 x 2 inch, $1.10 to $1.20; 2 x 3 inch, $1.40@$1.50; 3 x 3 inch, $1.70@$1.80; 3 x 4 inch, $2.10; 3 x 5 inch, $2.40; 4 x 6 inch, $3.15; 6 x 8 inch, $4.25. Wet ground, very fine, $120 @ $130 per ton. Bulk sales, dry ground, $32.50@$60.00 per ton. Scrap, $30 and up.	
Ocher, Georgia, ton, in sacks.....	$24.00
Pyrites, Spanish, per long ton unit of S, c.i.f. Atlantic ports	(a)12@14c.
Sulphur, Texas, mines, long ton.....	$18.00
Talc, f.o.b. works, ton: New York, purified	$18.50@$20.00
Vermont, extra white	$12.50
Tripoli, Missouri, ton: 40 mesh, cream colored.....	$14.50

(a) Nominal

IRON AND STEEL

Pig iron, gross ton, basic, Valley furnaces.....	$46.00
Steel, f.o.b., Pittsburgh billets, net ton.....	$52.00
Structural shapes, 100 lb.	$3.40

WASHINGTON REFLECTIONS

Seabrook Hull, McGraw-Hill Washington News Bureau

Truman Seeks Broad Economic Controls

The Administration-sponsored Defense Production bill—H. R. 9176—will have far reaching effects on the way you do business. Its provisions are general, but they may give President Truman even more power over our industrial economy than President Roosevelt had during World War II.

However, along with controls, there are some sections which will be welcomed by many marginal producers.

Title III of the bill—expansion of productive capacity and supply—provides for several new Government aids to industry. Here are some of the ways the bill provides to make it easier to get working capital and plant expansion money:

There'll be Government guarantees of working capital loans and of advances by banks to enable you to buy equipment and materials needed to complete a defense contract quickly. These loans will be guaranteed with "procurement money" appropriated by Congress to various departments.

There'll be long-term low interest rate loans to "private business enterprises for the expansion of capacity, the development of technological processes, or the production of essential materials";

There'll be long term procurement contracts and advance payments to guarantee delivery or increase production of essential materials, both in the U. S. and abroad. These contracts may be made for purchases at higher than "currently prevailing market prices . . ."

The President has asked that the limit on borrowing by present or newly created Government corporations for these purposes be set at $2 billion.

In H. R. 9176, the President has also asked for power to control industrial inventories of essential materials, and, where necessary, to requisition industry stockpiles.

He wants, and will get, authority to decide just how big a supply of various materials a manufacturer can lay in ahead of time.

He wants, and will get, authority to requisition—for "just compensation"—any materials, like manufacturers' inventories, plants, or equipment needed for national defense.

The figure decided on by Government appraisers as being just compensation will be appealable through the courts, but it won't delay actual requisitioning.

As set up by the Administration, the new powers sought to control margins don't include metals futures markets.

One of the major sections of the bill deals with allocations and priorities of materials and facilities. It states that contracts and orders necessary for national defense shall take priority over any other contracts or orders.

In effect it guarantees that defense contractors will get what they need ahead of anything else. The bill won't give the Government power to ration consumer goods for household or personal use at the retail level, even though many Congressmen and labor leaders have been advocating it most strongly.

While expanding industrial credit facilities, the bill at the same time would give the President power to clamp down on consumer and real-estate credit. The object is to cut back the demand for goods using the same materials and productive facilities as are needed for war contracts.

Congress intends to have a good look at this bill before passage, but it will probably come through pretty much as outlined here. In its original form it has no obvious provisions putting Government into business except as a creditor.

No Intent to Draw On Stockpiles

Washington has no intention, and sees no foreseeable need, for drawing on the national defense stockpile of strategic materials in the present emergency. The only time they think they would have to do so would be when enemy submarines start sinking ships and disrupting important sea-lanes. U. S. submarine defenses are limited, and very few U. S. merchant ships are capable of out-running German-type Russian snorkel submarines.

The stockpile appropriations bill as passed by the Senate cuts more than $28 million from the House approved figure of $33.6 million. It, however, makes most of that up by adding $25 million to future contract authority, raising this figure to $125 million.

As expected, the Senators killed the House provision limiting to $24 million the amount of money that could be spent for strategic materials in the U. S.

Blunder of Soviets Changes Our World

The Ko-Red attack on June 24 changed the nature of things in Washington and all over the world. In a series of statements by the President and his cabinet officers the U. S. has thrown the gauntlet down to Russia. It's an ultimatum that any further attacks by Soviet satellites or Russia herself will mean war with the U. S. and the entire Western world. Fifty-two nations have supported the United Nations in its decisions on Korea. Only seven are opposing. That's the east-west line-up.

No one knows at the time of going to press just what Stalin's answer will be. He has a clear opportunity to choose between peace and war. Our own guess is that he won't provoke war at this time, but will return to infiltration and propaganda methods, cheap to him but costly to the democracies, making the most of the fact that it is U. S. forces who are on foreign soil.

Meanwhile, the pattern of what you can expect from Washington has changed. The country is preparing to mobilize its industry, economy, and armed forces. The only question remaining is whether it is for total war, or a long-continuing half-war like we're in now. In either case the business trends are the same. The only difference lies in degree and speed.

Blueprints for mobilization, such as they are, are predicted on an all-out effort. Nobody is ready for a sub-war, and if this proves to be the Kremlin choice, we can expect the usual aches and pains of a trial-and-error system, with more public criticism than occurs during full mobilization. But don't delude yourself that limited or voluntary controls will last very long. Even a half-war will bring on full controls. The difference will be that controls, even though full, won't be as disruptive to the economy as during an all-out effort.

ECA Okays More Loans For Foreign Mines

As of May 31, 1950, ECA Strategic Materials purchases for stockpiling totaled only 64.3 million of which 3.5 million were in dollars, the rest in counterpart funds. Of this $27.6 million went for rubber purchases. The rest breaks down as follows: Sisal, $7.1 million; diamonds, $4.9 mil-

lion; bauxite, $4.5 million; palm oil, $4.1 million; graphite, $3.9 million; platinum, $3.1 million; lead, $1.3 million; sperm oil, $0.8 million; cryolite, $0.5 million; other, $6.5 million. Outside sources have also reported purchase of 80,000 flasks of mercury.

New projects for exploration and development of strategic material resources, by this date, amounted to $24.9 million, of which 13.7 million was in ECA "Special Fund" dollars and 7.2 million 5% counterpart funds.

Three new projects, two of which were approved in May and one of which was approved in July, included research and development on zinc, industrial diamonds, and nickel. The zinc project entails an ECA advance to an Italian mining company for the production of zinc. $1,494,180 worth of 5% counterpart Italian lire made up the loan. Repayment will be out of production in zinc deliveries to the stockpile.

In May the ECA approved a loan of $500,000, plus $100,885 of French counterpart francs to French equatorial African mining interests for the increased production of industrial diamonds. Repayment will be in diamonds for the stockpile.

Also, in May another development project was approved for $965,000 ECA dollars to increase the output of nickel in New Caledonia. Repayment in also out of production.

By commodities the money for these projects breaks down as follows: Bauxite, $11.0 million; lead and zinc, $4.3 million; diamonds, $2.3 million; nickel, $1.0 million; cobalt, $0.6 million; other $0.3 million; exploration surveys, $1.5 million.

The ECA shortly expects to approve another project for the development of Jamaica bauxite. In this case an affiliate of Aluminum Co. of Canada will develop mines and build an alumina plant.

One of ECA's latest projects involves development of extensive lead-zinc deposits in French North Africa along the Moroccan coast.

Another big project calls for modernization of the Portuguese Port of Beira, Mozambique, Africa, a major outlet for Rhodesian chrome and copper. Repayment of part of this loan will be with Portuguese strategic materials.

LABOR THIS MONTH

Joseph M. Gambatese
McGraw-Hill Washington News Bureau

MOBILIZATION: It will make labor tight, of course. No wage or strike controls are yet in sight. Nor consumer price controls. All this, plus profit control, will come if and when we get into all-out war.

MANPOWER: Studies of labor supply by industries, skills and areas are being made by manpower office of National Security Resources Board. It's headed by Robert L. Clark, New Englander long in Government employment service. Manpower controls are not contemplated for long time. Will try voluntary means first.

WAR LABOR BOARD: One is being planned if we get into war officially. No-strike and no-lockout pledges will be expected from labor and industry. NSRB is figuring on another tripartite setup of Government, labor and management. Some opposition to this comes from industry men on last WLB. They think an all-public WLB would be better.

DRAFT: It's taking non-vets under 26. Few skilled workers will be affected, because most draftees will be non-vet youths under 24. But you can lose skilled men in the reserves.

DEFERMENTS: You can get deferment of a man whose work is "necessary" to the National interest. Write to his draft board. No forms available yet. You may have to show that the worker can't be replaced. Each case will be decided individually by each draft board. There are no "group deferments" by occupation.

COMMUNISTS: Watch them. They are making trouble, sabotaging aid to Korea. Sometimes a right-wing union will help you get rid of a Commie.

CAN YOU FIRE A COMMUNIST: You can under Taft-Hartley, but be careful so you can't be accused of firing him for union activity. If you have a union contract, you'll have to check whether the contract forbids it.

Communist propaganda is getting more intense. "March of Labor," a monthly, has been revived. It peddles the Communist party line for the labor movement.

CARLSBAD: Mine, Mill and Smelter Workers licked the rival CIO steel workers badly with underground workers at Carlsbad potash mines. Mine, Mill won elections covering underground workers at International Minerals Corp. and Potash Co. of America. A runoff with the Machinists Union is necessary at U. S. Potash. Machinists won 15 small elections.

Why did CIO President Philip Murray's union lose, and lose badly? They couldn't promise the workers much more than they already had. And, for psychological reasons, the steel workers had to push for an early election when they were unprepared.

WAGE TREND: It's upward, yet. Survey by Bureau of National Affairs of second quarter 1950 contract settlement shows more wage increases, fewer pensions, than first quarter. In non-ferrous metals, two-thirds of increases were 4 to 6 cents an hour.

Union strategy is to get a wage increase now, or the Government may freeze you out of one. Pensions can wait.

ESCALATORS: More unions want cost-of-living formula like that of General Motors. That's to protect workers against loss due to rapidly rising living costs. Some are taking a modest wage increase now, with a commitment for more year. Lehigh Portland Cement Co. is giving 8 cents now, another 5 cents next May.

Brief, but Important

ASSESSMENT WORK—S. 3639, the bill giving claim-holders until October 1 of this year to do mine assessment work for fiscal 1950 was signed into law July 1, 1950. Fiscal 1951 work will have to be completed by June 30, 1951, however. Alaska is included in the extension along with the 48 states.

SKELETON ALLOCATION—There's considerable backing behind a plan to control the flow of metals to defense by putting only steel, copper, and aluminum under direct allocation. Under the plan, steel allocations would indirectly but effectively control the end uses of tin, manganese, chrome, nickel, tungsten, molybdenum, vanadium, cobalt, and other important companion materials. Direct control of copper and steel would give Government a good check on the movement of zinc to industry. Finally, when you control aluminum, you control the light-metals industry.

MEXICAN TARIFF—In late June the State Department announced cancellation of the Mexican trade agreement because of Mexico's nonadherence. This restores the Act of 1930 rates (E&MJ, June, 1950, p. 88) on lead (metal concentrates, etc.), molybdenum ore, and fluorspar.

The cancellation takes effect Dec. 31, 1950, unless these items are included in the impending negotiations at Torquay, England, and the newly negotiated rates apply sooner.

COPPER TARIFF—Senate approval of the one-year copper tariff suspension until June 30, 1951, is made certain by the Korean crisis. Between the necessity of solidifying the Western world diplomatically, the present strong demands for copper, and the expanded defense effort, domestic producers will be lucky if they can get by with only a nine-month waiver of the duty.

PERSONAL NEWS

CERTIFICATES FOR SAFETY ACHIEVEMENT were presented to 206 miners and their supervisors at American Zinc Co.'s Mine No. 2, Mascot, Tenn., on June 24. Supervisors and foremen receiving certificates for redistribution to their men from Dr. James Boyd, Director, U. S. Bureau of Mines (front center) are, standing from left: H. A. Coy, W. C. Armstrong, William B. Davenport, Paul R. E. Stair, William A. Wyrick, Luther V. Wagner, Homer C. Morrell, C. W. Daniel and H. W. Childress. Howard I. Young, company president, is shown seated in right background.

R. Sholto Douglas, who recently conducted a survey of American metal mines, has been appointed mining engineer to the Kingdom of Saudi Arabia. He left the latter part of June for Jedda, Saudi Arabia. Mr. Douglas was an adviser with the Bureau of Mining in Seoul, Korea, during the U. S. Military Government of that country.

J. D. MacKenzie, vice president, and **R. P. Reese,** assistant to the president, American Smelting & Refining Co., have recently completed a trip to the Southwestern properties of the United States, and the Mexican smelters of the company.

Kenneth C. Brownell, president and **R. F. Goodwin,** vice president, American Smelting & Refining Co., have returned from Australia, where they inspected operations at Mount Isa Mines, Ltd. While in Australia, Mr. Goodwin and **Julius Kruttschnitt,** managing director of Big Bell Mines, Ltd., visited Big Bell and other operations in that state.

At Columbia University the department of geology, continuing its policy of rotating administrative duties, has elected **Prof. Walter H. Bucher** to serve as executive officer for a period of three years. He succeeds **Prof. Paul F. Kerr** whose terms expired June 30, 1950. **Prof. Marshall Kay** has been elected educational coordinator and Prof. Kerr, research coordinator. These three officers will constitute an executive committee for the department.

Rawleigh Warner, chairman of the board of Pure Oil Co., has been elected a member of the board of directors of International Minerals & Chemical Corp., according to an announcement by **Louis Ware,** president. Mr. Warner was elected to fill the unexpired term of **John E. Bierwirth,** who recently resigned from International's board.

William J. Shedwick, Jr., consulting mining engineer of Mexico City, following examination of a number of maganese deposits in the Republic for the Teziutlan Copper Co., S. A. and Fundicion de Acero Electrico of Mexico, is making for the same companies a study of the chromite deposits of Guatemala.

L. M. DeLong, assistant superintendent of the refining department of The Consolidated Mining & Smelting Company of Canada, Ltd., has been appointed superintendent of the department, according to an announcement by **R. W. Diamond,** vice president and general manager. Mr. DeLong joined Cominco in 1927 as a chemist. He was transferred to the zinc department in 1930, and held various other positions before he was made special assistant to the superintendent of the smelter department in 1947.

Arthur E. Kendall, mining superintendent, has been appointed general manager of the Central Eureka Mining Co.'s operations at Sutter Creek, Calif. Mr. Kendall operated mines for Newmont Mining Co. for 17 years before joining the Central Eureka organization. He was manager of Newmont's Empire Star and several Canadian properties, and, most recently was in charge of the Resurrection mine, Leadville, Colo.

J. H. Pollard, sulphur engineer, has opened an office in Houston. A graduate of the University of Texas, he has had 25 years' experience as a consultant with major sulphur companies.

W. C. Page, formerly general manager of western operations, U. S. Smelting Refining & Mining Co., was elected vice president and general manager of western operations on June 14.

EDWARD W. ENGELMANN, assistant general manager, Utah Copper Division, Kennecott Copper Corp., was awarded an honorary degree of Doctor of Engineering at the commencement exercises of the Missouri School of Mines on May 29. He graduated from the school in 1911 and joined Utah Copper the same year. From 1918 to 1922 he assisted in developing the recovery of minerals by flotation at the Utah Copper, Nevada, New Mexico, Montana and Arizona properties of the Kennecott corporation. In 1923 he was appointed superintendent of the Magna plant. He was named general superintendent of mills in 1938, and was appointed to his present position Jan. 1, 1949.

E. Benson, supervisor of labor relations, personnel division of The Consolidated Mining & Smelting Company of Canada, Ltd., has been appointed assistant to the manager of the personnel division.

A. W. Edelen, assistant general manager of American Smelting & Refining Co.'s mining operations in Mexico, retired the end of June, after 43 years with the company. He will continue to serve as consultant to several companies.

Forbes B. Cronk, who retired a year ago as general mining engineer for Oliver Iron Mining Co. and has since acted as a consultant in connection with the subsidiary Orinoco Mining Co. of Venezuela, was fully retired July 1. On June 15, he attended a testimonial dinner given for him by **R. T. Elstad,** president. Mr. Cronk was associated with the Oliver company for 45 years.

Lyle F. Campbell, mining engineer, formerly with the E. J. Longyear Co., is now with the engineering department of the M. A. Hanna Co. at Cooley.

John H. Stitzer, mining engineer, has taken a position with the Maturi Corporation of Chisholm, as engineer and secretary.

John A. Gernert, mining engineer of Duluth, has joined the engineering department of the M. A. Hanna Co. at its Hibbing office.

Richard Allen Young, manager of the Dumas, Tex., division of American Zinc, Lead & Smelting Co. since 1940, has been named a vice president of the parent company. He first worked for the company during his summer vacations at different plants. Following his graduation from Washington University and Harvard Graduate School of Business Administration, he was made assistant to the plant manager at East St. Louis in 1939.

William J. Wendt of Baker, Ore., graduate of Oregon State College, will join the staff of the mining experimental station at Washington State College.

Dr. Francis A. Thomson, president of the Montana School of Mines, has been awarded the Distinguished Achievement Medal of the Colorado School of Mines. The award was made by Chancellor **George A. Selke,** of the University of Montana, on behalf of the board of trustees of the Colorado School of Mines, of which Dr. Thomson is a graduate.

ALVIN C. EIDE, vice president and manager of the pigment division of American Zinc, Lead & Smelting Co., has been made a vice president of the parent company. He joined the company at its Hillsboro, Ill., plant following graduation from the University of Illinois in 1916.

Victor G. Ford was recently appointed general manager of the Sinai Mining Co., Ltd., at Abu Zenima, Sinai.

Paul L. Anderson is superintendent at the ferrosilicon grinding plant of Rhude Media Co., near Marble, Minn., on the Mesabi range. In the past he has been on the concentrator staffs of Andes Copper Co. and the phosphate rock division of Anaconda Copper Co., at Conda, Idaho.

John Smeddle has completed his contract with the Institute Fomento Industrial, branch of the Colombian Government, investigating mine possibilities in the Ibague district, and revising the mill flow for complex ores of their custom mill, La Metalurgica, located near the city of Ibague. His present address is Princeton, B. C.

E & M J Salute for Outstanding Service

RALPH NEYMAN

A FLAIR FOR MECHANICS prompted Ralph Neyman, general superintendent of the Hecla Mining Co., in its North Idaho operations, to make a special study of underground mechanical problems. Several rather radical mechanical changes in mining methods have been the result. As an inventor, he is responsible for the slusher turntable, now nationally used. He also designed the "Neymatic" car and automatic dump and the Neyman "Side-Stepper," car transfer for tunnels. He is credited with the invention of a one-man jumbo for use in stopes and has developed the "Ney-Swing" bucket dump for shaft sinking.

A native of Kansas, Mr. Neyman moved to Idaho in 1906. After completing high school he studied, through a nationally known correspondence school, land surveying and structural and mechanical engineering. From 1924 to 1929 he completed a course in mining engineering. In 1930 he joined the Hecla Mining Co. and specialized in mechanical problems, such as the study of detachable type bits, and mine dust control problems. In 1936 he designed and supervised the construction of the Star 1200 underground hoist room, which consisted of cambered beams and longitudinally corrugated liner plates of all-weld construction.

During a severe flood in 1938, Mr. Neyman was lent by the Hecla company to the city of Wallace, Idaho, for supervision of rehabilitation and the design and construction of protective measures against future floods.

While at the Hecla engineering office he designed an automatic dumping skip for lowering ore in a shaft. This skip and dump is shown in the revised edition of "Mine Plant Design" by Prof. W. W. Staley.

When sinking and development operations were conducted by the Hecla company in the property of Atlas Mining Co. Mr. Neyman acted as superintendent. After completion of this planned development, he was appointed mine superintendent of the Hecla and Star mines, and in 1948 was appointed to his present position.

He has given special study to the handling of underground mine timbers to the Star mine, where a trip through two vertical shafts and a long crosscut, with the various transfers, is necessary. By purchasing certain underground timbers packaged to skip size in the sawmill, and the use of Hyster equipment, they are speedily unloaded, piled and then transferred to the shaft and place of use with a minimum of handling.

Mr. Neyman has been as generous in passing along his ideas as he has been ingenious in developing them. Numerous technical articles in *E&MJ* and other technical journals are evidence of his willingness to help others in their mining problems.

In addition to his position as general superintendent, he is a member of the board of directors of Hecla Mining Co., Polaris Mining Co., Silver Summit Mining Co., Chester Mining Co., Sullivan Mining Co., Resurrection Mining Co., and Rock Creek Mining Co., all affiliates of the Hecla Mining Co. He is also president and manager of New Hilarity Mining Co. and Silver Bowl, Inc.

RECENT CHANGES in the Phosphate Rock Division of Davison Chemical Corp. include the appointment of Dr. Allen T. Cole (left), formerly chief engineer, as manager of the division, succeeding the late William H. Gabeler. At the same time Edgar C. Weichel (center), superintendent of operations, was made assistant manager, and J. W. Pamplin (right) was named chief engineer.

Earl Marble, manager of the Tacoma plant of the American Smelting & Refining Co., has recently completed a trip to the Eastern plants of the company and is at present en route to the Philippines.

H. F. Hurley, general manager, Mexican Smelting Department, American Smelting & Refining Co., has just completed a trip to the company's East Coast smelters and refineries.

Everett L. Joppa, general superintendent for mines at Hibbing, Minn., for Pickands, Mather & Co., has been transferred to the Duluth general mining offices as an operating assistant. **E. J. Fearing,** general superintendent of mines on the eastern Mesabi range, is now general superintendent of the Hibbing district. **Maurice L. Bradt** becomes his assistant. Mr. Fearing is succeeded on the Eastern Mesabi by **Thomas C. Thielman,** superintendent of the Embarrass mine.

R. M. Becker, a recent graduate of the University of Minnesota, and **Robert Riedel,** of Michigan Tech, are members of the geological department of the Cleveland-Cliffs Iron Co., at Ishpeming.

Earl Hunner, retired general manager of M. A. Hanna in the Iron River, Mich., district, and now executive consultant, and **G. M. Cannon,** formerly assistant general manager and now an executive consultant, were paid special tribute by **George M. Humphrey,** of Cleveland, president of the M. A. Hanna Co., at a banquet in honor of the employees who have been with the company for 15 years or more.

E. C. Jones, Ely, assistant superintendent of Vermillion range iron mines in Minnesota for the Oliver Iron Mining Co., retired June 1.

Joseph F. Thorn, general manager and director of Lake View & Star, Ltd., in Kalgoorlie, has resigned. He was formerly general manager for Goldfield Consolidated, in Nevada, Cia Minera del Jabali, Nicaragua, and Balsas Unit for Cia Minera de Penoles, Mexico. In 1929 he took a group of American mining men to Kalgoorlie and reorganized the Lake View and Star properties, enlarging their holdings through consolidation and purchase of adjoining properties.

Frank Pickard, mine superintendent at the Tsumeb mine, Southwest Africa, is in the United States on vacation until early September. His address while here is 2412 Durant Ave., Berkeley, Calif.

SUMNER M. ANDERSON, Latin American specialist for the Foreign Minerals Region, U. S. Bureau of Mines, left Washington June 15 for a three-month observation tour of important mining areas in South and Central America and Mexico. Mr. Anderson expects to collect pertinent information relative to current and potential mineral developments in nine countries.

A. P. Claudet, manager for the Schlumberger Well Surveying Corp., has been elected president of the New Orleans Geological Society. Other officers elected include **Paul Lewis,** vice president; **John Collier,** secretary; and **Eugene Baysinger,** treasurer.

OBITUARIES

Ernest A. Hersam, 82, professor emeritus of metallurgy at the University of California, died June 24 in Berkeley, Calif. He had been retired for 10 years.

J. S. Coupal, consulting mining engineer, died in June in Phoenix, Ariz. A native of Massachusetts, he came to Arizona in 1920 as general manager for Arizona Tip Top Mines Co. Subsequently, he served a number of other companies in a similar capacity. In 1938, Mr. Coupal took over the field organization work for the Arizona Small Mine Operators Association. The following year he was named the first director of the Arizona Department of Mineral Resources. He resigned in 1944 to return to private consulting practice. Mr. Coupal was elected president of the Arizona Small Mine Operators Association in 1946, a position he held at the time of his death.

Andrew L. Engels, who retired in 1947 as superintendent of the concentration plant of Copper Range Co., died recently in Harvard, Ill. He had previously served as chief mechanical engineer for Calumet & Arizona Mining Co., and on the staff of the Shattuck-Denn Mining Corp. and the Miami Copper Co.

William C. Hanson, 65, of Duluth, a former president of the National Iron Co., died in June. After his retirement from the National Iron Co. he was associated with Pickands, Mather & Co. in the development and beneficiation of taconite.

Edwin L. Shogren, 68, mining captain at the Eureka mine of the Castile Mining Co., died June 18.

A. G. Robertson, superintendent of the refining department of The Consolidated Mining & Smelting Company of Canada, Ltd., has been made special assistant to the manager of the metallurgical division. He joined the company in 1935.

Frank Richard Plughoff, mining engineer and operator, died June 29 at Hailey, Idaho, after a long illness. The son of a pioneer Idaho family, he studied mining engineering at the University of Idaho. He lived in California and Nevada and returned to Hailey in 1927, where he had practiced his profession until he became ill. He was president of the Hailey chapter of Idaho Small Mine Operations. He was 55 years old.

John Orson Kemple, 73, well known in Utah, Nevada and Arizona mining circles, died June 28 at Las Vegas, Nev. Son of John Kemple, who was credited with the discovery of the famed Silver Reef silver deposits near Leeds, Utah, he spent much of his boyhood there. Later, he served for 20 years as foreman of the Gold Road operations in Nevada. He retired in 1942.

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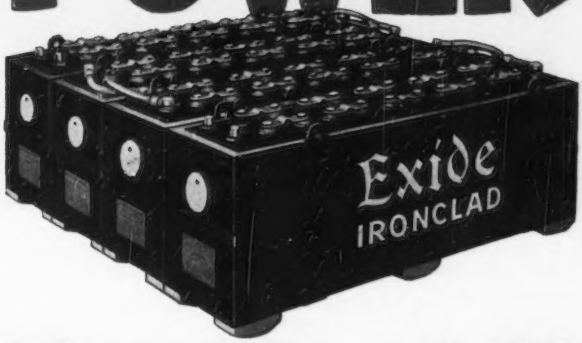

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NEW GOLD DISCOVERY was made on Tillery vein. Portal to the Tillery workings is considerably to left of headframe and surface plant of El Paso property shown above.

STOCKPILE OF ORE from newly discovered zone is estimated to contain more than 1,000 tons running about $20 in gold per ton. Chief gold bearing mineral is calaverite, a telluride.

Gold Strike at Cripple Creek

IF YOU VISIT CRIPPLE CREEK today and ask what's going on that's important, the residents will invariably tell you about the rich gold strike which Earl Robush and his brother John recently revealed at the El Paso property which they are operating under lease from James A. Knight and Thomas A. Copeland, owners. Although the initial discovery was made in 1948, the subject was kept quiet pending completion of the New Carlton mill now under construction nearby.

The discovery was made in the Little May tunnel which leads to the Tillery vein situated a short distance southeast of the present El Paso shaft. Earl Robush stumbled on the new ore as he crawled through the tunnel while attempting to reach the Little May mine. He became suspicious of a little brown streak on one of the walls of the tunnel. Samples from this point assayed 3 oz. in gold. He drove further on a trend line which proved to be an extension of the Tillery vein. Development to date has exposed a bonanza 120 ft. below the grass roots of Beacon Hill on which the El Paso holdings are located.

More than 100 ft. of drifting has revealed good ore which assays as much as $300 per ton over 4 ft. wide in some spots. Additional stoping above the tunnel level and underhanding below has yielded additional good ore, some of which is still broken in the stopes and others stockpiled outside the portal.

One shipment of high-grade of 113 lb. to the Leadville smelter brought $1,262.50. Total value of small ship-

(*Continued on page* 114)

EARL ROBUSH, superintendent of El Paso, points out a tight brown-stained veinlet which first attracted his interest.

LATER DRIFTING REVEALED that the ore-bearing zone widened out to 4 ft. with stringers going into the walls.

MR. ROBUSH PICKS OUT RICH ORE from the face of the drift, some of which runs $50 per lb. and is sacked for shipment.

IN MINING

IN THE UNITED STATES

- Mining Congress Convention Program—P. 114
- New Activity on the Comstock Lode—P. 124
- Labor Trouble Threatens Utah Production—P. 147

ALASKA

★**Havenstrite Mining Co. will operate a new 4-ft. dredge** on Mud Creek this season, together with working on Upper Candle Creek and on Bull Hill. At the latter location a longer runway is being constructed in order to land DC-3 aircraft.

★Strandbergs are **employing about 30 men at their Indian River Gold property.** They will also do development work on Candle Creek where they are preparing to operate their dredge.

★Ten men, directed by George Forney of the U.S. Geological Survey, **will map parts of Alaska in an unusual way.** A helicopter will carry them to mountain peaks for their day's work and then pick them up at night. They expect to work north along the Alaska Railroad.

★Reports from Washington say that **work for the U.S.G.S.** in Alaska, pending appropriations by Congress for the 1951 fiscal year, includes: Coal investigations, north side of Alaska range, in Matanuska area, and on the coast of Cook Inlet; petroleum and oil investigations, Cook Inlet and Yakataga area and on Naval Petroleum Reserve No. 4 in northern Alaska; mineral deposits, Kuskokwim in Willow Creek district, between Anchorage and Kodiak, near Klukwam, Glacier Bay district Juneau gold belt, both in Berners Bay and Juneau areas and Alaskan Railroad belt; research on volcanos, Attu, Agattu and Semichi Islands; damsites will be checked near Sitka and Cordova; permafrost studies in a number of areas; gaging stations are planned for several areas; ground water studies will be made, also topographic work in the Railroad belt district and Richardson Highway areas.

★**Helicolicon Mines Inc. will employ about 20 men** at the gold dredging operations on Klery Creek, recently taken over from Graham Lammers. Company President Armstrong reported that prospecting will continue at the Salmon River property.

★**Casa De Page Co.** at Deering will operate two dredges on Immuchuck River.

★**Frank Whaley and Sterling Montheue** will do assessment and development work at Rainbow in Kugruk area on Seward Peninsula.

★Senator Howard Lyng who returned to Nome early this summer said **U. S. Smelting, Refining & Mining Co. is operating three dredges** and will employ about 100 men "cold water thawing" ground for later operations.

★**U. S. Tin Corp. plans to install a mill** at its Lost River operations so lode operations can continue through the winter. A. F. McIntosh is manager and Erwin Adler from Bolivia's tin mines is with the company.

★**Tury Anderson and C. J. Koudeka** started stripping on Pedro Creek, near Fairbanks early this season.

★**Hydraulic operations on Hammon Creek** will be conducted by Carl Anderson, Enos Luoto and Joe Frienze.

★A report from Palmer on June 20 said **operations at the Independence gold mine** were being carried on with skeleton crews due to labor shortage. The wage scale ranged from $1.38 to $1.50 per hour, according to mine officials.

CALIFORNIA

★**Precious metals are on the upswing** in Kern County, with Mojave Mining & Milling Co., working gold ore from the Elephant, Eagle and Whitmore properties. The Big Butte mill at Randsburg recently treated ore from leasers in the Rand area. The old Walker gold mine in the Piute Mountains, active in the 1870's, is being dewatered for development work by Dan Cronin.

★**New shafts and tunnels** are being opened up at 3 gold mines near Marysville. A new main tunnel, to open the property to a depth of 900 ft. is being driven at the Midnight mine on Slate Creek Ridge. At the Hinton mine near Dobbins, a new shaft is being completed to a lower tunnel. The Slapjack property is being worked too.

★**California's output of gold, lead, zinc, silver and copper increased** 2% in value in 1949 over 1948. Total 1949 value was $20,616,562, with lead production reaching a level exceeded only in 1899 and 1917, peak years.

★**Gold and manganese mining is expanding** in Plumas County. In the Lucky S field, A. A. Harriman and M. A. Maier are driving a 500-ft. tunnel at their lode property. Peerless Development Co. is continuing stripping operations at their group of several quartz gold claims in the Wolf Creek district. Manganese ore has been shipped from the McMillan property near Canyon Dam.

★**H. W. Gould and Co. are abandoning their New Idria quicksilver mines** in San Benito County, after operating them since 1936. Reason for abandonment is the low price of quicksilver, and the importation of low-priced mercury from Spain. The mines, extending about a mile and a half into the ground, employed about 250 men during World Wars I and II.

★**The San Jacinto Mining Co., Long Beach, will begin processing tungsten** at its Banning plant. The company completed a deal to lease two acres of city property where ore will be hauled from nearby mines for milling and storage.

★**Coronado Copper & Zinc Co. resumed operations** at its Afterthought mine at Ingot, Shasta County, on July 1. K. C. Richmond will be mine manager. The mill has a rated capacity of 80 to 100 tons per day.

★The San Bernardino County board of supervisors has approved **construction of a dry process cement plant** on the site of the inactive Cajon Lime Products plant, Cajon, Calif. The plant will have a capacity of 10,000 barrels a day, and employ about 150 persons.

★**Inyo County mining has recorded**

(*Continued on page* 116)

1950 Metal Mining Convention, American Mining Congress

Program*

MONDAY • AUGUST 28

MORNING—FIRST GENERAL SESSION
- The Business Outlook
- Prospects for the Nonferrous Metals and for Silver
- Trend of Metal Production, Wages and Prices
- Problems of the Small Mine Operators

NOON—WELCOMING LUNCHEON

AFTERNOON—SECOND GENERAL SESSION
- Our Unmined Resources—Their Future Significance
- Sound Currency for a Sound Economy
- The Future of Gold
- The Foreign Aid Program and Its Relation to the Mining Industry

AFTERNOON—FIRST OPERATING SESSION
- "Packaged" Timber Handling
- Incentive System Increases Tons Mined Per Man-Shift
- Hydraulic Hoisting — A Unique Method of Moving Crushed Ore

TUESDAY • AUGUST 29

MORNING—THIRD GENERAL SESSION
- Domestic Supplies of Strategic Minerals
- Progress in Stockpiling for National Security
- Congress Reviews the Stockpile Program
- Tariff Needs of the Mining Industry

MORNING—SECOND OPERATING SESSION
- Operating Factors and Costs in Heavy-Media Separation
- Rod Mill Liners—Panel Discussion
- Application and Performance of New Holland Breakers
- Golden Cycle's Modern Mill

AFTERNOON—FOURTH GENERAL SESSION
- Safety Progress in Metal Mining
- Labor Relations Today—A Panel Discussion
- The Future of Our Labor Law

AFTERNOON—THIRD OPERATING SESSION
- White Pine—A Potential Major Copper Producer
- Progress Towards Production at the Blackbird Cobalt Mine
- Geochemical Prospecting—A Symposium
- How Aerial Photography and the Airborne Magnetometer Have Aided Extension of Ore Reserves

WEDNESDAY • AUGUST 30

MORNING—FIFTH GENERAL SESSION
- Current Proposals for Mining Law Changes—Government and Industry Views
- The Phosphate Industry—What It Means to the West
- The Valley Authorities Program

MORNING—FOURTH OPERATING SESSION
- Roof Bolting in Metal Mining
- Truck Haulage Power Plants
- Trackless Mechanized Mining in the Lead Belt
- Applicability of Oil-Shale Mining Developments to the Mining Industry

AFTERNOON—SIXTH GENERAL SESSION
- Atomic Energy for Industrial Power
- Uranium Procurement Policies and Plans
- Economics of Domestic Uranium Production
- Prospecting for Carnotite Deposits

AFTERNOON—FIFTH OPERATING SESSION
- Problems of Underground Rock Breaking
- Rock Drill Developments
- How to Get More Footage Out of Hollow Drill Steel
- An Over-All Look at Rock Drill Bits
- Progress in Blasting Procedures

THURSDAY • AUGUST 31

MORNING—SEVENTH GENERAL SESSION
- The Mining Industry—A Case for Special Tax Consideration
- Public Relations and Public Opinion
- Public Relations—Importance of the Stockholder

MORNING—SIXTH OPERATING SESSION
- The Fluosolids Process
- Plans for Treating Greater Butte Project Ores
- Tailings Disposal Problems

AFTERNOON
- Group Conferences on Taxation, Gold, Strategic Minerals, Public Lands, etc.

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**Subject to late changes.*

Gold Strike at Cripple Creek *(Continued)*

ments of high-grade to date is $3,555. More than 1,000 tons of ore averaging about $20 is stockpiled outside the portal, and an additional 8-ton pile of high-grade screenings which will run about $140 per ton. Estimated value of the screenings and stockpiled ore is about $21,000.

Calaverite, which contains about 39 to 42% gold according to geologic reports on the area, is the principal mineral. It occurs as bright metallic crystals (easily identified on fracture surfaces of the broken ore on the stockpile, and somewhat disseminated within the granite which constitutes the country rock). To a person not familiar with Cripple Creek deposits, the ore faces appear to be unexciting —nothing more than a fractured, brown-stained granite drift. But to an experienced Cripple Creek miner (Mr. Robush has worked on and off in the district for 23 years) there is plenty to attract attention. You have to develop a certain sixth sense to find ore here; Mr. Robush apparently has it.

Present aim of the Robush brothers is to use proceeds from the recent strike to help finance renewed development and exploitation of the El Paso operations. Their faith in the El Paso's future is based on three factors: (1) 1,150 feet of virgin ground below the old Roosevelt tunnel over an area of about 70 acres that is drained by the new Carlton tunnel; (2) that the El Paso has produced 435,000 oz. of gold from 1902 to 1941, and (3) assay records compiled in 1921-1922 which reported that ore still in place contained approximately 4,000 oz. in gold valued at $800,000 (at $20 per oz.). As a result of preliminary checks of these old exposures, Mr. Robush estimates that these records are reliable and on the conservative side.

Current work is restricted to repairing the upper part of the El Paso shaft. The hoist, compressor and surface plant are in excellent working condition. The mine is developed and partially exploited to the 1,288-ft. level. A winze extends below this.

Earl Robush is superintendent for Knight & Copeland, and contemplates investigating a number of likely looking "brown spots" in the mine as soon as development progress permits.

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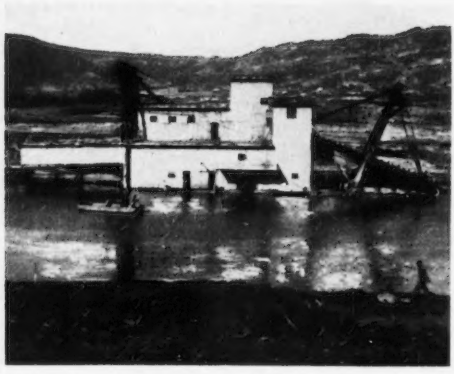
E & M J Report



Equipment and structural members of 36-year old Patco dredge at Belmonte, Portugal, are being moved to new site 15 miles away, and erected on cellular pontoon hull. Jigs will be used on dredge.

Veteran Tin Dredge Readied For New Task

A. H. ROBB, Manager
Portuguese-American Tin Co.
Belmonte, Portugal

SHUT DOWN in 1949[1] after 37 years of working alluvial tin deposits in the Gaia Valley, in the Beira Baixa district of Portugal, the dredge of the Portuguese-American Tin Co. is being dismantled and the machinery and structural members are being transported to a new gravel deposit in the Machainas Valley about 15 miles away. The estimated life of the new property is five years. The gravel is similar in type and depth to that formerly worked.

At the new site the equipment, after being overhauled and, where necessary, replaced, is being erected on a new hull built at the Yuba Consolidated Goldfields plant in the San Francisco Bay area and shipped to Portugal. Yuba directs the operations of the Portuguese-American company.

This hull is of the cellular-pontoon type and was specially designed for the purpose. It was shipped to Portugal in separate pieces and erected at the site by local labor. Bolted together, the pontoons weigh about 135 tons. Some 20,800 bolts were used.

On the old Patco dredge, concentration of the dredge product (cassiterite and ilmenite) was obtained by means of riffled sluices and Harz-type jigs. On the new dredge a battery of special Yuba diaphragm jigs of latest design will be substituted. They will be capable of treating more than 1,000,000 cu. yd. of feed per year.

Only Dredge in Peninsula

The old dredge, erected in 1912-13, to work the deposits, then Spanish-owned, has been the only one in the Iberian Peninsula. In time, the properties were taken over by the Portuguese-American company under Yuba direction. Power was originally supplied to the dredge from a steam plant erected at the Belmonte railway station, 12 km. from the site, via a 6,000-v. line built by the company. About 1921 arrangements were made to take hydroelectric power from a Portuguese company in the Serra da Estrela and the Portuguese-American company built 35 km. of a 40,000-v. line for the purpose.

The life of the property then was estimated at about 10 years. In 1926, however, Ralph E. Gruber became manager and the prospect improved greatly. Further prospecting was done with the result that the dredge continued operating until December, 1949, 15 years longer than expected. Figures are not available for the early period but it is estimated that 37 million cu. yd. was dredged, representing an area of about 8 sq. km.

The old dredge operated successfully during both World Wars. In 1936, on the initiative of Mr. Gruber, the company built a tin smelter at Belmonte station, to treat its own ores. The metal produced is guaranteed 99.9% tin plus and is used extensively in the Portuguese sardine packing industry.

The Patco dredge has not left a desolated countryside. The banks of the river Gaia, where dredged, were replaced and strengthened by stakes and wire and willows, being kept this way until they were completely consolidated.

[1]By a coincidence, a 36-year old dredge in Portuguese East Africa likewise ceased operations in 1949, as told in the January, 1950, issue of the *Excavating Engineer*.

California (*Continued*)

substantial progress during the past six months with accent on lead, silver, tungsten, zinc and industrial minerals.

United States Vanadium Corp. is operating its Pine Creek scheelite property with a large crew. Molybdenum Corp. of America is reported considering erection of a tungsten blending plant near Bishop. A few small tungsten mines are also steady producers in the region.

★**High-grade gold ore has been developed** on the 200-ft. level of the Skyrocket mine at Hodson, Calaveras County, by the Mount Diablo Exploration Co. The orebody, which extends along the vein for 90 ft. was discovered by crosscutting from the 205-ft. inclined shaft.

★Fred Santoni, Fresno, is operating an **8-in. suction gold dredge** on the Fresno side of the San Joaquin River.

★**U. S. Geological Survey will direct sinking of two deep diamond drill holes at Iron Mountain** near Redding to obtain geological information on the mineralization at Iron Mountain and to prospect a favorable structure. Drilling contract has been awarded to R. C. McClintock, Spokane.

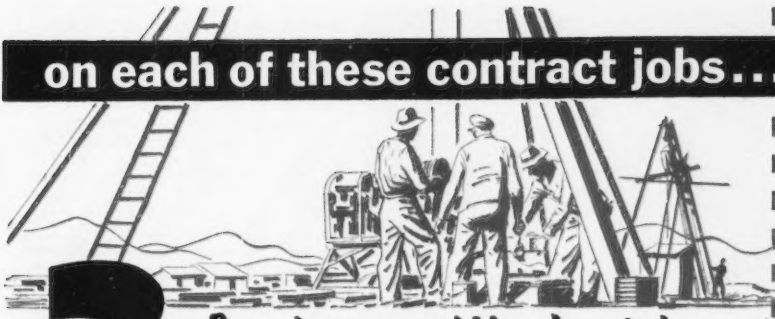
COLORADO

★**Open-pit gold mining** has started at the Crystal Hills Mining Co., in the San Luis Valley district according to John Hamm, company president. Cost of processing this **low-grade ore** is about $2 a ton at the screening and crushing plant, and about $4 per ton at the mill.

★**Rico Argentine Mining Co.** is the third largest lead-zinc producer in the state of Colorado, having yielded $13.5 million worth of ore during the past 10 years. The company now controls 3,000 acres in the Pioneer district, Dolores County. Production has been limited to about 35,000 tons per year, the capacity of its flotation mill. Recent exploration has resulted in discovery of several new bedded ore deposits now under development.

★The recent rise in metal prices has helped the base-metal mining com-

on each of these contract jobs...



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Hydro Electric Board of Scotland, Loch Fannich, Ross-shire.

INDIA—Gold core drilling.
Mysore Gold Mining Co., Ltd., Marikuppam, India.

FRENCH MOROCCO—Base metal core drilling.
Mines de Bou Skour, Ouarzazate, French Morocco.

BRITISH GUIANA—Sampling.
Demerara Bauxite Co. Ltd., MacKenzie, British Guiana.

CANADA—Core drilling.
Steeprock Iron Mines, Atikokan, Ont.

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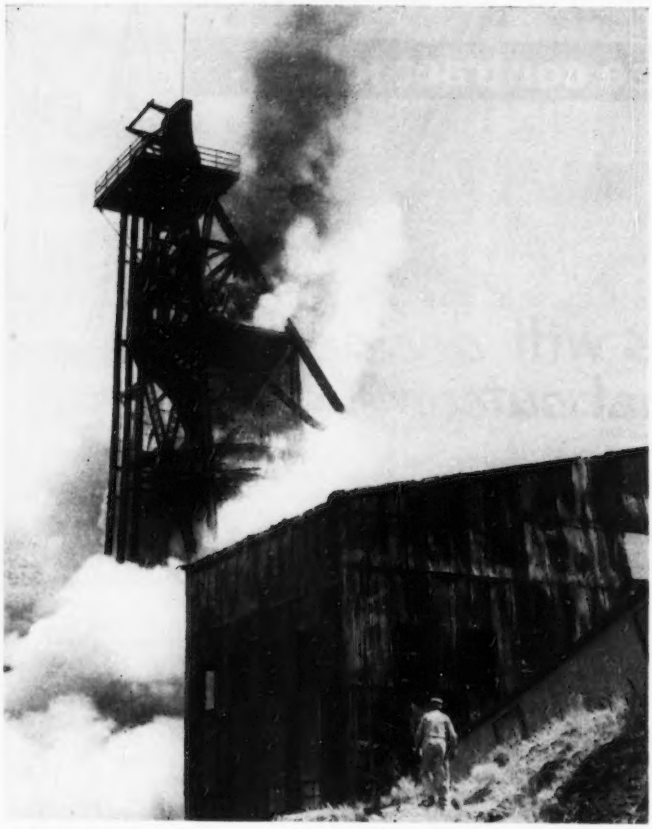

FIRE in the main shaft at the Copper Canyon Mining Co. property near Battle Mountain, Nevada, caused an estimated $50,000 damage. Fourteen men trapped underground for 4 hours were led to safety through an auxiliary shaft by Bob Raring, manager. Hot particles from welding were blamed for blaze.

Colorado *(Continued)*

panies in the San Juan area, according to G. A. Franz, Mine Inspector, and increased activity in the industry is expected this summer.

★**U. S. Bureau of Mines** will shortly award a contract for an additional 3,500 ft. of drainage tunnel to remove water from the Leadville area.

★**Gold Mines Consolidated, Inc.**, recently shipped 50 tons of lead concentrates and 60 tons of zinc concentrates. Assays indicate that the lead concentrates carried about 50 oz. silver and about 70% lead per ton. Zinc concentrates contained about 50% zinc and 20 oz. silver per ton. The shipment netted about $7,500.

★Plans for a large uranium mill at Grand Junction are under way. Stearns-Rogers Manufacturing Co. of Denver was expected to be awarded the contract for rehabilitation of a former sugar factory to house the new plant. Climax Uranium will enter the uranium field. It is a joint company of Climax Molybdenum and Minerals Engineering companies.

IDAHO

★Diamond drilling from a southwest crosscut on the 2800 level of the **Coeur d'Alenes Mines Corp.** property has located a silver-copper vein assaying 38 oz. in silver across a width of 15 ft. The company is now driving a crosscut south some 300 ft. to open this vein. Another diamond-drill hole tapped what is believed to be the same structure further west. Although the new discovery is believed to outcrop on Coeur d'Alene Mines ground, it is in American Silver Co. ground on the 2,800-ft. level. The two companies will share 50-50 in production.

★**Day Mines, Inc.**, is resuming operations on its zinc-lead mines in the Beaver district north of Wallace, which have been closed since last fall because of the low zinc price.

★**Metropolitan Mining Co.'s** 1/16th interest in the ore production from Sunshine's Yankee Girl vein netted the company $2,875 for the month of May. Production in May was 714 dry tons averaging 41 oz. of silver per ton. Mill and smelter recovery from this production included 28,732 oz. silver, 13,270 lb. copper, and 1,286 lb. lead. Sunshine is now continuing its long crosscut into Metropolitan ground, and is now advanced 2,200 ft. south of the Yankee Girl vein on the 3,100-ft. level.

★**American Smelting & Refining Co.** is the third big American company to enter the Metaline zinc-lead mining district. American Zinc, Lead & Smelting Co. was the first and the Sullivan Mining company (subsidiary of Bunker Hill & Hecla) second with an initial investment of $3,500,000.

The AS&R has taken over from the Willow Creek Mining Co. the Van Stone mining property of 14 claims in Stevens County, Wash., and has optioned considerable more adjacent ground, according to J. E. Berg, general manager of Federal Mining & Smelting company, (AS&R subsidiary) of Wallace, Idaho. No announcement has been made as to the plan of development, but the company has opened an office at Northport, Wash. Diamond-drilling operations have been started under the management of A. N. Mastrovich, resident engineer. The Van Stone property is 26 miles from the Sullivan company's operation in Canada.

The Metaline district is an extensive low-grade zinc-lead field containing blanket type ore deposits similar to the Tri-State field. It is estimated that the field extends about 50 miles south of the Canadian line into northeastern Washington and 32 miles north of the line to Ymir, British Columbia. Big companies exploring the deposits in Canada include the Canadian Exploration company at the Emerald mine, where they are reported to have diamond drilled a zinc-lead deposit 50-ft. thick; Consolidated Smelters Co. at the Hudson Bay mine and the New Jersey Zinc Co. at the Haukendahl mine.

The American Lead, Zinc & Smelting Co. is now producing a large tonnage of ore from the Grandview mine in Washington and the Sullivan company is producing large tonnages from both the Pend Oreille mine at Metaline Falls and the Reeves-MacDonald mine in British Columbia.

★**Idaho Power Co.** is building a power line from Armstead, Mont., to **Howe Sound Mining Co.'s** cobalt mine (Selera Mining Co.) near Forney, Idaho. Cost is estimated to be $650,000. The line is expected to be extended as far as Salmon, Idaho, by July 1, after which it will be extended to the cobalt mine in the Blackbird district.

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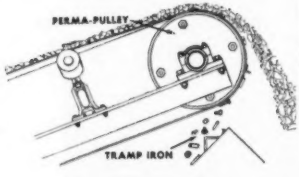
listing standard sizes of Perma-Pulleys and describing design features.

*It is not usually economically practical to build non-electric magnets with *effective* ranges exceeding 5" to 4".



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IRON COUNTRY

★Up to Jan. 1, 1950, the **Hull-Rust-Mahoning group of mines had shipped 486,840,000 tons of ore.** The half-billion-ton mark will have been reached in late 1950 or early 1951. Including the 373,834,000 tons of waste which have been removed, total tonnage from this area amounts to 860,674,000 tons. It covers 1,450 acres with 57 miles of track, many miles of truck roads and has a maximum depth of 475 ft.

★Harry A. Humphreys, Jr., New York, president of the United States Rubber Co., after a two-day trip through Mesabi range mines, says that **Minnesota's famed iron ranges will continue to be America's basic source of iron minerals** for the next 50 years. "The iron ranges need not fear competition from foreign ores," Mr. Humphreys said. "America's industrial machine is so large that it requires all the raw materials which the Lake Superior district produces in addition to supplemental ores from foreign fields. This area will continue to produce ore at a high rate for many years. Some of the cream may have been skimmed off but there are millions of tons left to be mined and processed. The iron mining industry will make as much use of the skimmed milk as was made out of the cream."

★**Erie Mining Co. in early June made an initial shipment of taconite pellets** from its Aurora plant to the Zenith furnace of the Lakeside Iron Corp. at Duluth. Thorough tests of the pellets will be made during the summer as about 10,000 tons will be shipped.

★M. A. Hanna Co. **mines which have received certificates of achievement in safety** from the U. S. Bureau of Mines are the Douglas, Weggum and Patrick groups on the Mesabi range, the Richmond mine on the Marquette and the Hiawatha No. 1 on the Menominee range.

★**Inland Steel Co.'s new Great Lakes freighter,** the Wilfred Sykes, made the 837-mile trip from the Superior, Wis., docks to Indiana Harbor, Ind., in 54 hours and 35 min. with a cargo of 17,655 tons of iron ore. The best previous time for the same trip was just under 70 hours.

★**M. A. Hanna Co. produced 1,402,658 tons of ore during May** of which 926,240 tons came from its operations on the Mesabi range. The Patrick group at Cooley was the largest contributor with 196,600 tons.

★**The screening plant at Inter-State Iron Co.'s Sullivan pit** at Calumet has been disassembled and the material will be used in erecting a new plant at the Hill-Annex mine. This plant will be located to handle ore from the north extension of the pit and a cross conveyor will carry the screened ore to the present loading pocket, providing a good mixture with

the ore extracted from the main pit.

★**Pacific Isle Mining Co.**, of Hibbing, is mining and stripping at the York mine at Nashwauk; mining and developing at the Lamberton mine, west of Hibbing; diamond drilling near Randall, Minn., in Morrison County and will mine and develop the ore that is located in the old Croxton mine near Buhl for the Hedman Mining Co.

★**Haley-Young Mining Co. is shipping ore from its Minnawas pit** at Virginia (formerly operated by Oliver Iron Mining Co.) and its newly delevolped Elbern pit between Chisholm and Buhl.

★**Shipments of iron by water** from the Lake Superior area to June 26 are far behind those of a year ago. The tonnage for 1950 to that date is 19,787,904, compared with 31,011,509 in 1949.

★Handicapping the 1950 season further, **a strike of switchmen on the Great Northern R.R.** (as well as on other western roads), which began June 25 and was still in effect on July 1, has brought ore shipments practically to a standstill. The roads supervisory men have handled a small amount of ore since the strike began, but the amount is negligible. Some of the affected mines are doing stripping work, but others are idle, pending a settlement of the walk-out. The switchmen belong to the AFL union.

★**Inter-State Iron Co.'s Schley mine at Gilbert** is stripping and is expected to produce from the pit in 1951. The Schley was formerly operated as an underground mine by Republic Steel. A new screening and washing plant will be built in time for 1951 shipping.

★**A. Lindberg & Sons, Inc., of Ishpeming, have completed the mining of about 80,000 tons** of ore from an open-pit operation at the east end of the old Lake Angeline mine, formerly operated by the Jones & Laughlin Co. The ore has been placed in stock-pile at the former Holmes mine property.

★Jones & Laughlin Ore Co. which, several months ago, announced that its geologists had **located a body of uranium ore** in Baraga County, states that exploration will be started there.

★**Oliver Iron Mining Co. is shipping ore from its Davis-Geneva mines** at Ironwood, Mich., on the Gogebic range, 200 miles by rail to Escanaba instead of to the docks at Ashland, Wis., as usually done. By this routing ore destined for the Gary, Ind., plants goes straight south by way of Lake Michigan, avoiding the long boat haul across Lake Superior and through the Soo locks. Fifty-ton ore cars and new diesel-electric locomotives handle the longer rail haul and from one to two days of total shipping time are saved between mines and furnaces. It is not known whether the arrangement is temporary or permanent.

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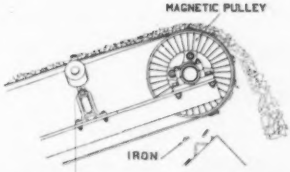

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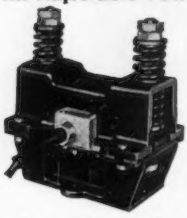

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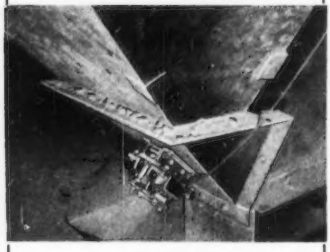

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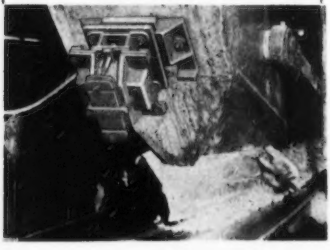

Iron Country *(Continued)*

Mather & Co. mines in the Iron River district are now on **a five-day week instead of four.** Cleveland-Cliffs Iron Co.'s Spies mine is also on a five-day week.

★**The Bradley siliceous iron-ore pit at Iron Mountain,** Mich., has resumed shipments to the Jackson Iron & Steel Co. furnace at Jackson, Ohio. Globe Iron Co. has also resumed work at its Globe-Cornell pit at Iron Mountain. This also produces siliceous ore.

★**M. A. Hanna's Hiawatha No. 1 mine,** idle for a short time because of runs of sand and water underground, is again producing.

★On June 21 at Stambaugh, Mich., was held the first of what is to be an **annual dinner by M. A. Hanna Co. to honor veteran employees.** Awards to these men were presented by Mr. Quayle and Mr. Fish.

KENTUCKY-ILLINOIS

★**Alcoa Mining Co.'s development work** at the Hutson mine, zinc and fluorspar orebody in the Kentucky district, will reach production stage within the next 3 or 4 months. The 100-ton flotation mill has been finished, the headframe is up, and surface installations are in readiness. The 523-ft. shaft is within 15 ft. of completion. Discovery of the Hutson orebody by diamond drilling represents one of the most outstanding developments in the Kentucky-Illinois mining district in recent years. Ore will average 28% zinc. Alcoa acquired the property through purchase of the Eagle Fluorspar Co.'s holdings.

★**Rosiclare Lead & Fluorspar Mining Co. has resumed operation** at its Pygmy properties near Mexico, Ky., after interruption of work for two months due to heavy spring rainfall.

★**Following settlement of a strike** which began June 1, employees of Minerva Oil Co., in the Cave-in-Rock district, have returned to work. Seventy-two employees, members of United Mine Workers District 50, were granted a 5-c. per hour wage increase as well as insurance and vacation benefits which aggregate a raise of approximately 7c. per hour. Employees had asked for a flat 8-c. per hour wage raise.

★**Inland Steel Co. has discontinued mining operations** in the Kentucky-Illinois fluorspar district. Milling of crude ore in stock will continue for the remainder of this year. The fact that the company has a sufficient stockpile of gravel spar for its steel plant for some time was reflected in its decision to abandon the Keystone mine in Kentucky. At present four barges are being loaded at the company's dock on the Ohio River, opposite Elizabethtown, Ill., for shipment to the steel plant at Indiana Harbor. Inland suspended its Rosiclare, Ill.,

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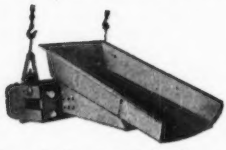

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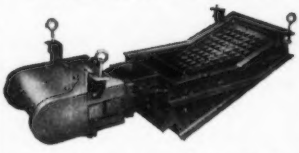

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operation in April, 1948. Mineral rights in the Illinois property were purchased by Rosiclare Lead & Fluorspar Mining Co.

MICHIGAN

★Michigan's Department of Conservation reports that **radioactive rock has been found in Dickinson County** near Felch. The Atomic Energy Commission has reported favorably on samples from the discovery and Michigan State Geologist, G. E. Eddy, will recommend that a three-year lease for exploration be granted. Any mineral activity would be welcome to this area, where the once busy iron mining industry is now small.

★**Calumet & Hecla Consolidated Copper Co. employees have been granted a raise in pay** averaging 11c. per hour and retroactive to May 1. A new contract was negotiated after the employees voted to join the CIO and dropped the International Mine, Mill & Smelter Workers' union.

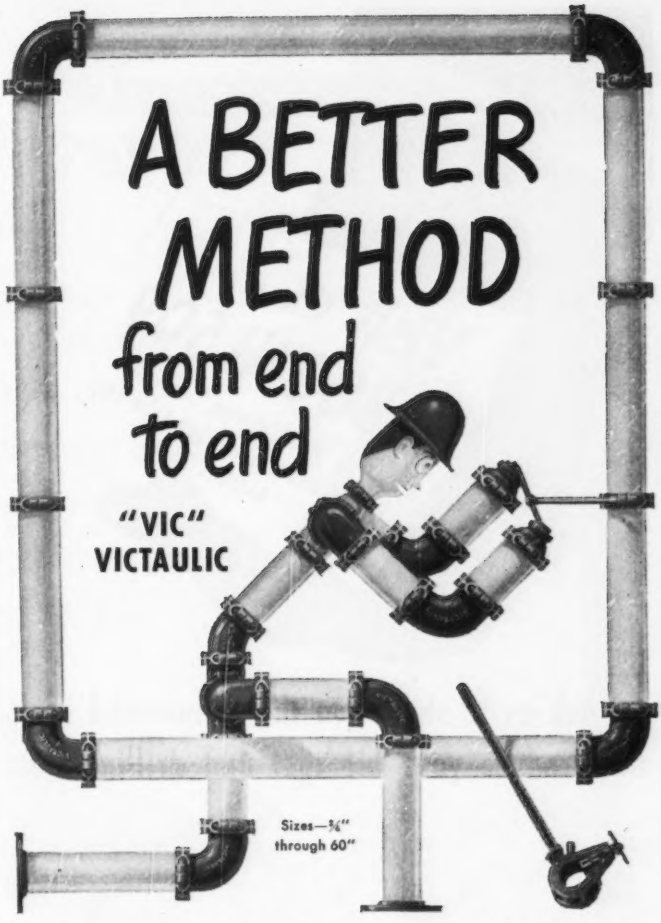
★**A fire at North Range Mining Co.'s Book mine** at Alpha on the Menominee range in June caused much damage when the engine house and change house burned. Production was not expected to resume until about Aug. 1. Because of this fire, the Book will not be able to meet its 1950 contracts for iron ore. Other North Range mines do not produce this grade of ore.

MONTANA

★**Domestic Manganese & Development Co., Butte, has resumed operations** after being shut down several months and is concentrating and roasting manganese ores accumulated at the government stockpile at Philipsburg during the last war. Seventy-five men are being employed, and the company is negotiating in Washington, D. C., for further manganese processing contracts.

★**Dr. Donald H. McLaughlin,** national president of the AIME and president of Homestake Mining Co., was the speaker at the 50th commencement exercises of the Montana School of Mines. Dr. Francis A. Thomson presided, and 61 degrees were awarded. Dr. McLaughlin received an honorary doctorate degree. At a luncheon given by the Montana Section, AIME, he awarded a Legion of Honor AIME membership to Samuel Barker, Jr., of Butte.

★**Nancy Lee Mines, Inc., will take over and develop the lowest level in the King and Queen group** of mining claims at its property near Superior, Mineral County. This entire property for the last six years has been under lease to E. G. Smith, Osburn, Idaho. According to the agreement, the own-



No matter how you look at it, VICTAULIC offers a method of piping that will save time, work, and dollars on construction and maintenance from one end of the line to the other.

The VICTAULIC METHOD is easy, quick, and sure. For joining those pipe ends—two bolts hook up Victaulic Couplings in a jiffy, a standard T-wrench is the only tool needed. AND Victaulic joints stay positive-locked, leak-proof . . . they stand up under extreme pressure, vacuum, or strain conditions!

Grooving those pipe ends is a cinch with the VICTAULIC METHOD . . . "Vic-Groover" grooves 'em automatically in half the time of a conventional pipe threader!

Victaulic Full-Flow Elbows, Tees, and other Fittings are designed for free-flowing efficiency . . . to give complete versatility and dependability to the VICTAULIC METHOD.

You just can't beat the COMPLETE Victaulic System for efficient piping construction . . . it's the EASIEST WAY TO MAKE ENDS MEET.

* * *

Make *your* next piping job ALL VICTAULIC. Write today for these two: Victaulic Catalog and Engineering Manual No. 44, "Vic-Groover" Catalog No. VG-47.

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26TH VICTAULIC YEAR

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The easiest way to make ends meet
VICTAULIC
PIPE COUPLINGS AND FITTINGS

. . . Ask us to show you the Kennametal Tools that reduce your bit cost and drilling time

STYLE DC BIT
For rotary drilling non-metallic minerals and other medium hard materials.

STYLE PA BIT
Used for percussion drilling in quartzite, granite, and similar materials.

STYLE FD BIT
Used for rotary drilling non-metallic minerals, and laminated sandstone.

CHOPPING BIT
For use in structural specimen drills, to get large, easy-to-identify chunks of structure.

STYLE SD BIT
Solid head bit for rotary drilling smooth, straight holes in hard, non-uniform material.

KENNAMETAL®

Kennametal Inc., Latrobe, Pa.

Montana (*Continued*)

er company will later take over all the workings, the mill and mining equipment of the Nancy Lee lease.

★Harvey Machine Co., Torrance, Calif., has taken an option on 700 acres of land near Columbia Falls and the Hungry Horse dam site, Flathead County, Montana, on which the company **may construct an aluminum fabrication plant.**

★**Mike Horse Mining & Milling Co.,** owned by the American Smelting & Refining Co., resumed operations on July 1. The company is normally the second largest producer of lead and zinc in Montana and shut down operations last December, due to the low price of metals at this time. A. E. Haeseler, Mike Horse, is general superintendent and J. E. Berg is general manager. The company's mines are located in Lewis & Clark County, 53 miles northwest of Helena.

★Walter P. Coombs, chairman of the Montana Industrial Accident Board, announced that, effective July 1, the **board will make a general rate reduction of 20%** for all employers operating under the state mutual plan, known as Plan III. It was further announced that, "Thereafter the board will periodically review the rate structure in the light of the safety record of the individual employer. If the employer has reported no accidents, the lowered rate for him will be maintained. If, however, his accident record is high, an upward adjustment of his rate will be made in accordance with the formula established by the board. After July 1, 1950, it will be up to the individual employer as to the assessment rate on his Plan III compensation coverage."

NEVADA

★**Drilling was started** June 5 at the Ophir property on the site of the old Comstock Lode, 600 ft. north of the Piper Opera House in Virginia City. Rea C. Tenney, of San Antonio, Tex., and Aquinas Feeney have taken a 20-yr. lease on ground owned by Consolidated Virginia Mining Co.

The lease covers the area from the 250-ft. level to the level of the Sutro tunnel which is at 1,700 ft. The drilling is in charge of J. J. O'Brien.

According to old maps of the Comstock the vein, which was explored but bypassed when the Big Bonanza was discovered, should be cut by drill on the Ophir grounds at a depth of not more than 450 ft.

★**Driving the long cross-cut tunnel at Candelaria** by the Newmont Mining Corp. got underway in June. Harry Miller, former employee of Newmont at Goldfield, has been awarded the contract at a rate of $9.75 per foot. The agreement calls for 1,000 ft. of tunnel with possible additional work

(*Continued on page* 144)

HAZARD'S 3 POINT IMPROVEMENT

IN HAZACORD TWIN PARALLEL MINING MACHINE CABLE SETS NEW STANDARDS FOR

- SAFETY,
- SERVICE LIFE,
- FLEXIBILITY

■ **INCREASED SAFETY.** See how the tough, flame-resistant Hazaprene ZBF Sheath completely encases each insulated conductor, forming a solid Hazaprene barrier between the power and grounding conductors of Type G, and between the power conductors of Type W. This new separating wall prevents short-circuiting . . . adds substantially to the cable's overall flame-resistance. Internal slipping of cable components is eliminated because the interlocking construction of insulated conductors, grounding conductor, reinforcing cord and Hazaprene sheath forms one integral mass.

■ **EXTENDED SERVICE LIFE.** Notice the non-rotting, non-wicking moisture-resistant open braided cord over each insulated conductor. This reinforces the heat-resisting, long-aging rubber insulation that's firmly bonded to the conductors . . . and locks the insulated conductors within the sheath.

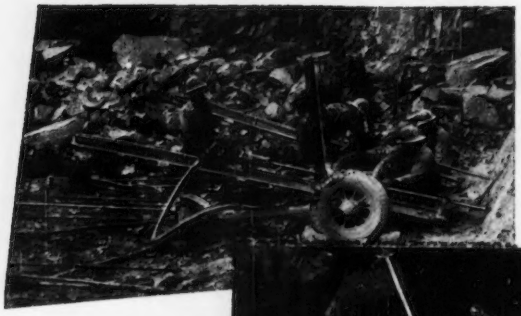
■ **GREATER FLEXIBILITY.** Note the flat, braided grounding conductor which permits compact cable design for maximum reel capacity . . . provides complete flexibility without strain for the highest speed reeling applications.

Forget whatever you've learned to expect in the way of cable life and all-around performance from twin parallel mining machine cable in shuttle car service or other fast-reeling applications. You can set your sights higher with Hazard's new Type G or W. And in addition to the "inside" improvements described above, don't forget the "outside" advantages you get with the Hazaprene ZBF Sheath. This tough, Hazard-developed neoprene compound combines greater flame-resistance and durability than was ever before possible. Hazacord Twin Parallel Mining Machine Cable exceeds the flame-test requirements of the U. S. Bureau of Mines and Pennsylvania Department of Mines — "P-104 BM" is molded into the sheath of every cable at frequent intervals.

Write today for further information about the new Hazard twin parallel cable or ask your Hazard representative. Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

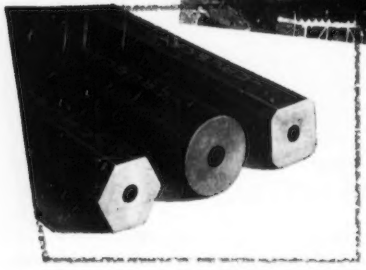
HAZARD insulated wires and cables for every mining use

8371



you can't beat

CRUCIBLE HOLLOW DRILL STEEL *for* LONG LIFE!



The *long life* of Crucible Hollow Drill Steel . . . even under the severest drilling conditions, is the reason why you get *lower cost per foot drilled* when you use this high quality drill steel. This is no idle claim! Controlled hardenability, perfection of stress-bearing surfaces and uniform processing all contribute to your assurance of maximum performance.

But even more! *Every lot* of Crucible Hollow Drill Steel is *pre-tested* for the harder, faster blows of modern drills. Cut down on costly job delay, and get the most out of your drilling equipment...specify Crucible Hollow Drill Steel.

Let Crucible Hollow Drill Steel answer your drilling problems. To help you cut drilling costs, Crucible makes freely available to you an alert metallurgical staff. These engineers and metallurgists are well qualified from long experience to show you how Crucible Hollow Drill Steel can best fit your requirements. Take full advantage of Crucible's half century of specialty steel leadership. Put us to work – working for you! CRUCIBLE STEEL COMPANY OF AMERICA, Chrysler Building, New York 17, N. Y.

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HIGH SPEED • TOOL • STAINLESS • ALLOY • MACHINERY • SPECIAL PURPOSE • STEELS

HOW TO GET The Most Out Of THE MINING CONGRESS EQUIPMENT SHOW:

- **Be prepared to see the best equipment show ever put on by the AMC Manufacturers' Division.**
- **Plan to come away loaded with good ideas on cost-cutting, labor-saving, improving recovery, safety and mine plant design.**
- **Before you go to the show, study this special convention preview which:**

1. **Tells you about the items** to be featured in each booth at the show.
2. **Presents a convention floor plan** and shows the exact location of all exhibitors.
3. **Provides a convenient check-off box for each booth** so that you can remind yourself what you want to see when you attend the show.

.....**if by chance you will not be able to attend the show,** you can still benefit immensely by reading this section because:

1. **The booth-by-booth descriptions** will tell you about the important new products to be featured.
2. **A keyed postcard and classified summary** appears at the end of this section. Mark the items you want to know more about. Send the card to E&MJ, and additional information will be sent to you.

.....**but that's not all.** Some manufacturers who will not be in the show are making extra efforts to give you important information about their products elsewhere in this issue. The index on page 142A will help you find this. A keyed postcard is also provided if you want to learn still more about the items featured.

What This Adds Up To

PLAN TO ATTEND THE SHOW. Take key members of your staff with you if you can. But in any case, let this special section convince you that August is a good month to review your equipment and supply needs. Use this section as a guide to the best that's being offered in today's competitive market.

A Super Show Awaits You

M. L. McCormack

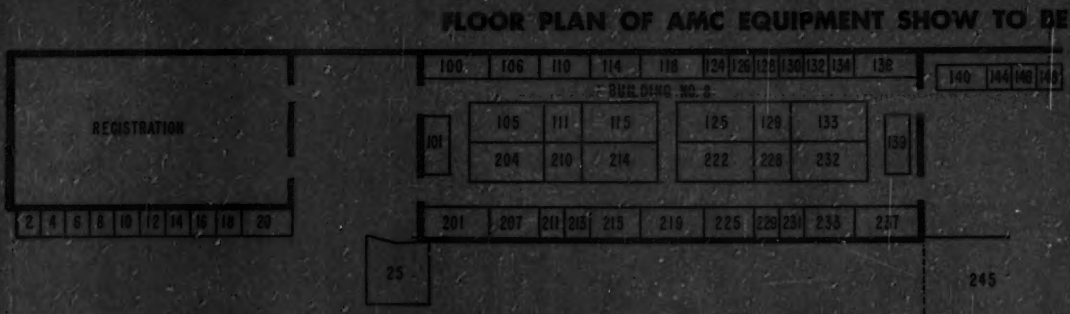
A PRE-CONVENTION CANVAS OF EXHIBITORS, upon which this section is based, indicates without question that the AMC Manufacturers Division, under the chairmanship of M. L. McCormack, has done an outstanding job in arranging the show. More than 110 suppliers and manufacturers are using every conceivable method to give you a quick, clear understanding of their products. If you so much as glance at all of the cutaway diesel engines to be shown, you ought to walk out of the show a diesel expert. Plastic operating models, units with transparent windows, and exploded models will be used to demonstrate important operating features. You will even be able to drive a mine locomotive and operate a spiral classifier to satisfy your curiosity.

Expert metallurgists, drill steel men, and mining technologists offer you a wealth of consulting services if you will only take this opportunity to find out who will be there, and prepare some questions pertaining to your most urgent operating problems.

Perhaps you have been reading about the new single-use rock bits, torque converters, lightweight drills, milli-second delay blasting caps, jet piercing, roof bolting, new heavy-duty scalpers, or Tricone mills. If you want to know more about them, check the booths that will display them in the following pages.

Reams of useful literature at "literature bars" will be available. Find out in this section what to look for and ask for.

We would like to underscore M. L. McCormack's invitational words in a recent convention announcement: "Mining men in charge of operations are urged to have their key engineering, production and maintenance personnel in attendance. The new ideas and enthusiasm they will bring back will more than repay the investment in sending them."



Booth-by-Booth Preview of AMC Equipment Show

(See also Convention Program Page 114)

If you do not have your marked copy of this convention preview with you when you visit the show, stop in at the ENGINEERING & MINING JOURNAL booth No. 310, and ask for a copy of the convention insert. We hope that it will serve as a useful guide to a pleasant and profitable trip through the show.

(Numbers in parentheses are booth numbers)

☐ **Allis-Chalmers Manufacturing Co. (401 and 407) Alex Schlueter in charge.** A Hydrocone crusher will be operating here to demonstrate latest design features. Ask one of the A-C representatives to explain how the crusher's main shaft is lowered or raised hydraulically to permit quick and accurate product-size adjustment. Other equipment in operation will be a Ripl-Flo screen, a 3x3-in. rubber-lined pump for handling liquids with solids of 325 mesh to ⅛-in., and a model of a 10x8-in. solids pump with automatic Texrope drive. The last unit will actually show you how rpm. and capacity change by merely adjusting the Texslide motor base *while the drive is in operation*. Other A-C mining equipment including a mine hoist control, service elevator, ball mill, rod mill, switchgear, dewatering pump, Low-Head screen, and bracket bearing motor will be displayed in a photo background.

F. C. Bond, T. V. Canning, Will Mitchell, Jr., J. E. Dunn, Frank Briber, W. A. Meyer, Arthur Ziehm, H. A. Wright, Alex Schleuter, B. A. Seare, J. R. Olin, D. H. Gieskieng, W. C. Kinnon, and H. W. Erickson, are the A-C representatives expected to be on hand.

☐ **Allis-Chalmers Tractor Division. (25) H. J. Masuhr, Jr., in charge.** An HD-19 tractor driven with a torque-converter unit will be featured here.

☐ **American Air Filter Co., Inc. (505)** Exhibit will feature the Type N Roto-Clone Dust Collector which removes dust from gases by exhausting them through an unique S-shaped water curtain. This principle proved effective during the war to remove highly incendiary magnesium dust. Inquire also about the Roto-Clone Type-W Dynamic Precipitator which combines the functions of exhauster and dust separator. Light and fine particles are effectively collected by the ingenious addition of water sprays. Bulletin No. 277A describes and illustrates the Type-N model in great detail.

Bit Knocker for single-pass bits.

☐ **Alloy Steel and Metals Co. (324-326) J. M. McKean in charge.** Don't miss the newly introduced Pacific Slushmaster scraper which comes in 26, 34 and 42-in. sizes. Also inspect the Pacific bit knocker shown here which is useful for removing single-pass bits. Other products to be shown will include Pacific sheave blocks, sheave anchors, manganese steel crusher plates, and shovel tray pads.

☐ **American Brattice Cloth Corp. (122) D. Blaine Mikesell in charge.** Ventilation auxiliaries including brattice cloth, Mine Vent flexible tubing, and fittings such as Y's, T's, L's, and reducers will be featured here. Mine Vent rubberized powder bags of the pouch and knapsack type with capacities varying from 20 to 160 sticks of powder will also be displayed. Mine Vent tubing comes in various types designed to withstand heat, moisture, fungi, and severe acid. Ask for information on these types at the booth.

List of Exhibitors and Booth Numbers

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American Wheelabrator & Equipment Corp. 616
Anaconda Wire & Cable Co. 314
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Armco Drainage & Metal Products, Inc. 911
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Barber-Greene Co. 110
Bethlehem Pacific Coast Steel Corp. 514
Bucyrus-Erie Co. 611-613
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☐ **American Bridge Company (318) See item under U. S. Steel Corporation.**

☐ **American Manganese Steel Division, American Brake Shoe Co. (136) Gilfry Ward in charge.** Here you will want to see the scale model in wood of a renewable lip type dipper. Manganese steel shell liners and grates will also be on hand. Also, be sure to inspect the hammer-mill hammer, track rollers, sprockets and idlers which have been hardfaced with welding rods. Others who will be there to show you around are J. B. Terbell, Harry D. Sweeney, J. T. Boisserane, W. C. Bruton, T. C. Baker, and N. E. Maclean.

☐ **American Steel & Wire Company (318) See item under U. S. Steel Corporation.**

☐ **Anaconda Wire and Cable Co. (314) A. W. Tracy in charge.** Two important improvements in mine cable will be introduced here: (1) The use of cold rubber insulation which adds greater life to mine cable, and (2) a new kind of shuttle car cable which has given excellent service in introductory applications. Four panels, each one illustrating a different type of cable for mine use will be on display. Kenneth G. Eaton and C. B. Peck will also be in attendance at Booth 314.

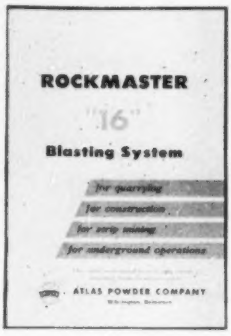
☐ **Albert and J. M. Anderson Manufacturing Co. (614) James B. Luck in charge.** Operators using electric drills, shuttle cars, loaders, conveyors and similar units will want to inspect the Pow-R-Gard and Ground-Gard portable electric power distribution systems for mines featured here. These units are combined circuit breakers and power outlets in steel or aluminum enclosures. Ask for a copy of Bulletin 64 describing coal mining applications and then check with someone at the booth for features which will prove useful in metal and non-metallic mines.

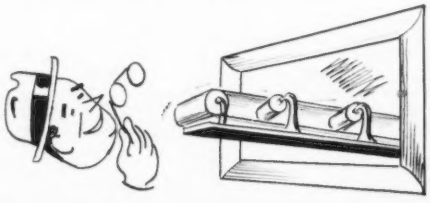
Steelox for mine buildings

☐ **Armco Drainage and Metal Products, Inc. (911) D. J. Stoker and W. H. Spindler in charge.** If you want to see what's new in metal construction, stop in at Armco's booth which will feature a wide range of products for the mining industry including Armco Steelox for building (shown here); tunnel liner plate for tunnels, shafts, haulageways, and storage bins; asbestos-bonded pipe for drainage; corrugated metal pipe for drainage and ventilation; quick-coupling pipe for air or water. Ask for booklets on each of these items—you will want them for your file of useful equipment and construction materials for mine-plant design.

☐ **American Wheelabrator and Equipment Corp. (616) Robert Pring in charge.** If you want to know how a Dustube cloth-bag-type dust collector works, stop in here and see one in operation through a plexiglas window built right in a unit. Also see the exhibit of filter tubes that have been in actual operation in mines, mills, and smelters. T. M. Stanger, George Tolton, and George Roper will also be present to meet you and answer your questions.

☐ **Atlas Powder Co. (114) R. K. Gottshall and John Swenehart in charge.** You've heard a lot about milli-second timing for controlling blasting. Here's your chance to learn more about it. Button-hole one of the Atlas representatives and ask him to tell you about the "Rockmaster 16 Blasting System" which employs the milli-second delay principle to improve blasting efficiency. Also ask for a copy of their bulletin describing this electric-detonating system. Information will also be available on the Atlas No. 4 blasting galvanometer, and the new plastic-insulated blasting-cap wire.





☐ **Barber-Greene Co. (110) E. D. Stearns and H. W. Newton in charge.** Get set to relax here. Ask for a pair of Polaroid glasses and then see in three dimensions the first Stereo color pictures ever made of mining equipment underground. Barber-Greene will not exhibit equipment, but will be happy to tell you all about their line of belt conveyors for mines.

☐ **Buell Engineering Co. (148) S. J. Pascual in charge.** A plastic model of an actual size 300 cfm. Buell (van Tongeren) cyclone collector will show you how the unit works. Action of the double eddy current is clearly visible. Buell will also exhibit the new PMF hopper discharge valve and photographs of the SF Svenska Flaktfabriken electric precipitator.

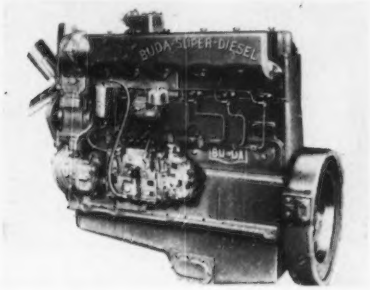
☐ **E. D. Bullard Co. (332) E.W. Bullard and Alpheus Bull in charge.** Sartorially-minded mining men will enjoy seeing Fiberglas hard boiled safety hats in 7 solid molded colors and phosphorescent molded finish. You can also see the lightweight aluminum alloy hat for surface mining as well as Morenci safety belts, first-aid kits and combustible gas indicators.

Aluminum hat

Ask for a copy of Bullard's bi-monthly bulletin, "*What's New in Safety*" and litera-ture on other safety equipment.

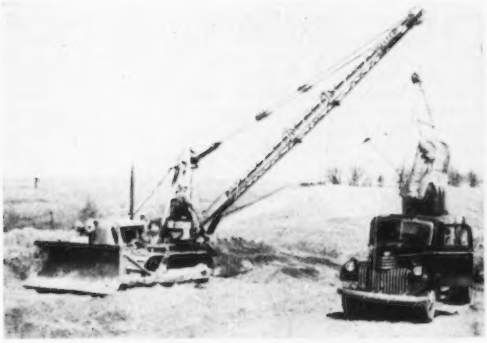
☐ **Bethlehem Pacific Coast Steel Corp. (514) James Crooks in charge.** Mining men will find Bethlehem's line of wire rope and hollow drill steel worth investigating at this booth.

☐ **Bucyrus-Erie Co. (611-613) E. M. Heuston, Publicity Manager, in charge.** Bucyrus-Erie, well-known for their churn-drill, dredges, and excavating equipment, will not exhibit any of these units, but will present an interesting photographic display.



☐ **The Buda Co. (704) H. H. Cohenour or Everett York in charge.** Here's your chance to see what makes a diesel engine tick because the Buda exhibit will feature an exploded 6DAS-844 Truck diesel engine mounted on a special stand. This unit is for heavy-duty highway and off-highway trucks. Other items shown will include a DAS-1125 supercharged diesel engine for off-highway haulage, universal diesel nozzle tester in boxes, and lifting jacks used in mining and construction work. Specification sheets will be available describing the Buda diesels and presenting graphs of torque and horsepower developed at various speeds.

☐ **Carnegie-Illinois Steel Corporation (318) See item under U. S. Steel Corporation.**



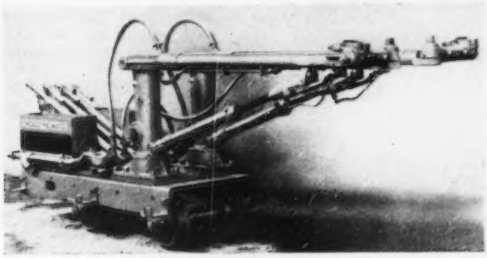
Hystaway tractor crane

☐ **Caterpillar Tractor Co. (Outside exhibit area between Buildings 8 and 9) W. H. Hogan in charge.** Here you will find exhibited the Caterpillar Diesel DW10 wheel-type tractor with Athey PD10Q wagon, D4 track-type tractor with HT4 Traxcavator, the large new V-type electric set, D311 cutaway engine, and D7 track-type tractor with Hyster Hystaway (see above).

Specification sheets on the displayed machinery will be available. Other Caterpillar personnel attending the meeting will be C. E. Jones, J. M. Abbey, J. G. Findeisen, R. V. Bradley, R. D. Evans, B. R. Fitton, M. E. Fearis, T. A. Glass and Earl Doubet. Staff members of Robison Machinery Co., Salt Lake City dealer, will also be on hand.

☐ **C. S. Card Iron Works Co. (605) H. B. Patterson in charge.** The Card representative will be glad to tell you the advantages of using their new 40-cu. ft. rocker dump ore car. Also featured are the 20-cu. ft. standard type ore car, standard rail turnout with switch stand, and rope sheaves and rollers.

☐ **Calumet & Hecla Copper Co. and Western Rock Bit Manufacturing Co. (521) M. W. Hawkesworth, G. L. Craig, Chandler Bush and Horrace Siegel in charge.** These two companies will join in presenting the Liddicoat one-use throw-away rock bit which has proven so successful in Canadian operations. The exhibit will point out the method of use of the bit with accompanying charts and graphs showing how Liddicoat bits cut drilling costs. A folder "Introducing the Liddicoat Detachable Bit" will be available so you won't have to take notes on what the bit experts tell you here.



C-P rail mounted jumbo

☐ **Chicago Pneumatic Tool Co. (723).** You'll have a chance to watch the new Model G-600 rail-mounted, twin-boom jumbo in operation. Pneumatic tools for mine use, equipment maintenance and shaft timbering will also be displayed or their application demonstrated. A complete line of sinker drills, demolition tools, drifters, diamond drills, stopers and the CP-8 gas-driven core drill completes the drilling equipment display.

☐ **Christensen Diamond Products Co. (708) W. I. Harris in charge.** An underground drill, a surface drill (screw feed and hydraulic) will be on hand for you to inspect. There will also be bits of all descriptions; core bits, casing bits, pilot bits, concave bits. And the associated supplies exhibited should keep the diamond driller absorbed for some time.

☐ **Colorado Fuel & Iron Corp. (700) Harmon H. Davis in charge.** The mine roof support bolts is the exhibit you don't want to miss here along with some sound advice on their application. You'll see too, CF&I's forged steel grinding balls and rods, Wickwire rope and Cal-wic Industrial screens.

Ask for the bulletin on the principal products of Colorado Fuel & Iron, and its subsidiaries.

☐ **Columbia Steel Company (318) See item under U. S. Steel Corporation.**

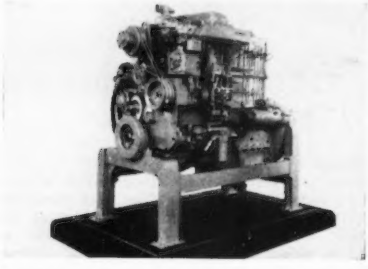
☐ **Crucible Steel Company of America. (615).** This is a good place to take your steel problems. On hand

to answer your questions will be C. W. Darby, one of Crucible's crack metallurgists, and R. M. Simpson, sales engineer. Just draw up a chair, make yourself comfortable and talk things over.

A. E. Perkins, R. L. Stark, W. E. Ellwanger, R. W. Persons and G. H. Wilkinson will also man the booth for Crucible.

☐ **Colorado Iron Works Co. (621) H. A. Storm in charge.** At this booth you can get a close look at the laboratory model and some first hand information on the new Weinig concentrator. This gravity concentrator is designed to bridge the gap between heavy media separation and flotation by effecting a gravity separation of particles too fine to be treated efficiently by the former process and too coarse for the latter.

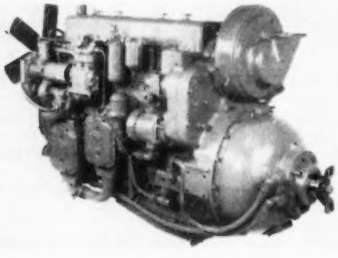
Don't forget to ask for Bulletin 50, describing the new unit.



☐ **Cummins Engine Co. (139) Howard P. Sharp in charge.** Three activated cutaway diesel engines, sectionalized to show internal structure and operation, including exclusive Cummins features, will be featured. Sizes included are the 150-hp. Model JS-600, 300-hp. Model NHRS-600, and 550-hp. Model NVHS-1200.

☐ **Cyclone Fence Division (American Steel & Wire Company) (318) See item under U. S. Steel Corp.**

☐ **Dart Truck Co. (610) W. C. Clayton and C. F. Barber in charge.** The Dart booth offers a photographic presentation of what their trucks are doing and can do in mining operations. And if delivery can be made in time, you'll see a show model of the latest in torque converters for extra heavy mining trucks.



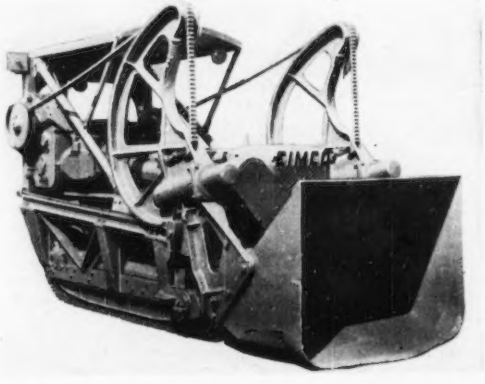
☐ **Detroit Diesel Engine Div., General Motors Corp. (414) R. V. Baxley in charge.** What makes the diesel be illustrated by the turntable cutaway diesel engine on display. You will also get a close-up of a G. M. diesel torque converter engine.

Also on hand to answer your questions will be G. F. Shoemaker, consulting engineer; H. K. McAfee, A. E. Bosetti, and G. R. Holly, sales engineers: and R. L. Burpee or M. Q. Fullington, sales promotion department.

☐ **Denver Equipment Co. (813) Henry J. Gisler in charge.** The men in the photo above are examining a No. 8 Denver 4-cell "Sub-A" unit in operation. You too will be able to see this machine concentrate a lead ore. Other units working in closed circuit with the flotation machine will include an agitator-conditioner, a wet reagent feeder and a sand pump. In addition to chief metallurgist Henry Gisler, other Deco metallurgists and engineers will be on hand to give you expert advice on ore-dressing problems.

☐ **E. I. Du Pont de Nemours & Co. (213-215) R. H. Summer in charge.** Here is where you can get information on milli-second delay blasting. The exhibit will feature the use of "MS" delay electric blasting caps in underground mining and recommendations covering equipment and its installation for improving the safety of electric blasting in underground operations.

☐ **Thomas A. Edison, Inc. (207-211) R. H. Weeks and C. F. Holcomb in charge.** Features of the exhibit will be a 35-cell C6 nickel-iron alkaline storage battery for locomotives and a 30-cell C8 battery for industrial trucks. Cutaway cells and an animated cell will show internal construction of a steel battery. A visitor-operated display will demonstrate how steel construction contributes to long battery life.

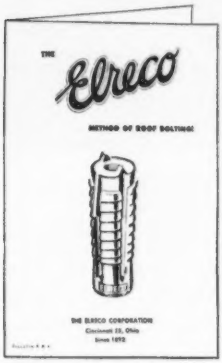


☐ **Eimco Corp. (305, 311, 404, 410) D. W. Saunders in charge.** Newest type RockerShovel loading equip-

ment will be on display. Underground models will be shown with either air or electric motors; surface models in either gasoline, diesel or electric types.

Eimco will also display its continuous vacuum filtration equipment and the folding scraper.

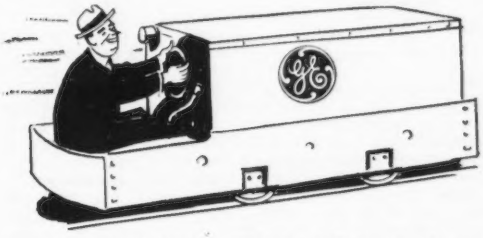
☐ **The Electric Storage Battery Co. (325) C. J. Moore in charge.** How many times can a storage battery lift itself with its own energy? If you can answer that, you may win a U. S. Savings bond at this booth. An Exide Ironclad battery will drive a motor which will operate a lifting device attached to the battery. The visitor guessing the closest to the actual number of times the battery will lift itself, gets the bond. Other items on display include a giant Exide Ironclad battery positive plate, a huge model of a slotted rubber tube used in Ironclad construction, and cutaway versions of industrial batteries.



☐ **The Elreco Corp. (156) F. M. Springer in charge.** A new type of insulated feeder suspension hook for suspending temporary or permanent power feeder lines will be on display here. Elreco will also show fused trolley taps, expansion units for roof bolting (Ask for their excellent pamphlet on this product), and general overhead line material.

☐ **Euclid Road Machinery Co. (901) A. S. McClimon in charge.** A new Model UD Rear-Dump Euclid will be exhibited here for your inspection. This latest addition to the Euclid off-the-highway line is powered with a 125 hp. diesel engine; has a 10-ton, 6.6-cu. yd capacity; and is equipped with a 10-forward and 2-reverse speed transmission. The following Euclid men will be happy to discuss hauling and job problems with you at the booth: R. E. Keidel, F. R. Sweeney, V. L. Snow, A. W. Lehman, M. H. Johnson, E. C. Dellen, and A. E. Sorensen. Specification sheets on the UD Euclid will be available.

☐ **Flexible Steel Lacing Co. (608) Hugh J. Beach in charge.** Essential items for cutting, lacing or fastening belts will be featured here, including Flexco belt fasteners and hinged belt fasteners, and Alligator belt cutters, lacing, and V-belt fasteners.

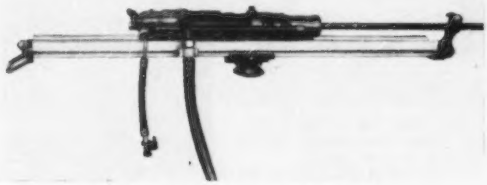


☐ **General Electric Co. (315) R. D. Ketner in charge.** Visitors to this booth will be able to operate the 1½-ton battery locomotive on the premises. A transparent plastic 10-hp. Tri-Clad pump motor will also be running. Other attractions include a two-shoe magnetic d.c. brake used for cranes and hoists, a flotation motor, a high-voltage air-break contactor for voltages between 2300-4800v. and a motor-generator battery charging set often used with trammers.

There will also be a panel showing various types of mining lighting equipment and the different types of cables made by G.E. for the mining industry.

☐ **The Galigher Co. (336) J. F. Woodhead in charge.** Millmen and metallurgists are invited to stop in and get the latest technical and operating information on Agitair flotation machines, Geary-Jennings samplers, ore dressing laboratory equipment, and specialized rubber-lined and rubber-covered material and equipment to be featured at the Galigher booth.

☐ **Gates Rubber Co. (516, 518) Joy Chiles in charge.** How to help you cut abrasion and corrosion wear on your equipment is the theme here, with displays of rubber covering and rubber faced plate. You will also see and be able to obtain information on Vulco rope drives and mine hose.



Feed motor is on the drill of this CF79

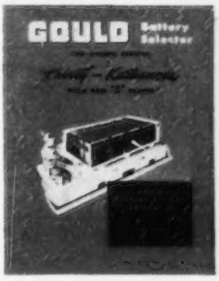
☐ **Gardner-Denver Co. (219, 225, 229 and 231) F. B. Matheson in charge.** When you check this exhibit, be sure to allow time to see the extensive line of mine equipment on display. Much of it has been introduced this year. Items shown will include stopers—RB104 and RB94; 3 and 3½-in. pneumatic drill columns; sinker drills—S17U, S33D, S48P, S55D and S73W; drifting drills CF99, CM93, S48D and air-feed leg; hydraulic drill jumbo with SF73, CF79 and CF93 drills; paving breakers; hoists; air slushers; drill-steel sharpener and hole puncher; air line oilers; backfill tamper and spader; pneumatic sump pump; air motors; 3-in double suction centrifugal pump; Model WBH air compressor and tank mounted compressor unit; GD14 mine car loader; and deep hole drilling equipment. The effect of "satinizing" rock drill parts will be demonstrated.

Other G-D representatives present will include G. V. Leece, B. C. Essig, A. W. Dale, R. S. Gibson, C. J. Manley, F. R. McNamara, L. W. Rodolf, R. R. Mayther, B. R. Sheets, O. G. Jarvis, H. Rueckert, and A. Rapp.

☐ **Goodman Manufacturing Co. (339) J. D. James in charge.** Mancha's Little Trammer will be displayed at this exhibit plus a new Mancha attachment which adds to safety in its operation.

☐ **Gould Storage Battery Co. (301) Jim Gilruth in charge.** Featured here is "Z" plate battery construction and how it helps you cut hauling costs. Cy Hart of Gould's West Coast office will be on hand to answer your questions about "Z" plate batteries for locomotives and shuttle cars.

P. S. Get a copy of "Gould Battery Selector".



☐ **Hardinge Co., Inc. (712) G. A. Wallerstedt in charge.** Hardinge is screening a double feature for visitors here. The first film shows Tricone mill fabrication

and operation, and the second shows the operation of heavy-media separators on the Mesabi Range.

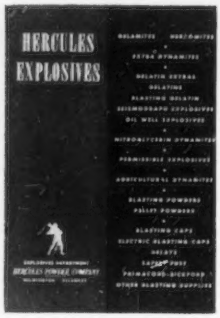
Hardinge personnel in attendance will include H. Hardinge, president; R. J. Russell, secretary; and R. L. Baldwin, assistant western district manager.

☐ **Harnischfeger Corp. (513) P. H. Hunter in charge.** Here you'll find a working model of magnetorque electric clutch drive, standard on all P&H electric shovels, and a display model of magnetorque electric clutch as used on large size diesel shovels. There will also be standard P&H electric hoists from 250-lb. to 15-ton capacity.

☐ **Hercules Motors Corp. (115, 214) Wm. P. Humphrey in charge.** Diesel and gasoline engines of all types and sizes abound here. Specifically you'll be able to look over the V-type, 8-cylinder diesel (Model DNX-V8) and 6-cylinder horizontal or flat engines (Models DFXHF, DWXLDF and DJXHF).

☐ **Hercules Powder Co. (100) George B. Bossert in charge.** Looking for information on explosives for metal mining? Then this is a good stop. In addition you'll see electric blasting caps including No-Vent Metal Delay and Short Period Delay electric caps.

You will also be able to get a highly informative little booklet entitled, "Hercules Explosives" which contains 62 "don'ts" to observe in handling explosives.

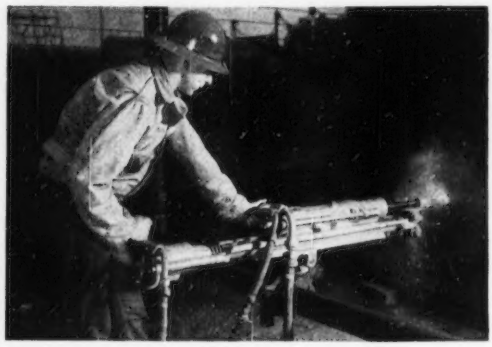


☐ **Hewitt-Robins, Inc. (801, 805, 809).** The men at this booth will show you a heavy-duty scalper in operation. It weighs less than 6 tons but scalps off rock-lumps weighing 4½ tons or more with hardly any vibration visible in the base frame. (Ask for bulletin No. 131). A condensed version of an extra-heavy-duty mine conveyor will also be in operation.

On display will be hose and belting products as well as idlers and screen cloth.

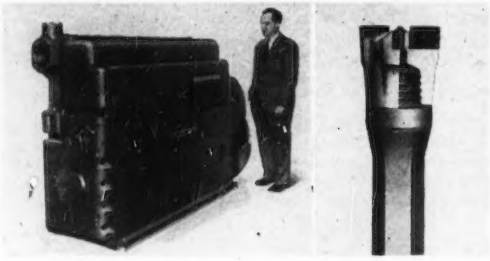
☐ **Humphreys Investment Co. (101) J. V. Thompson and W. E. Brown in charge.** Take time to watch a 5-turn, Model 24A Humphreys Spiral, operating in a closed circuit, take a 10-mesh feed and separate it into light and heavy mineral products. Ask Mr. Brown or Mr. Thompson to point out the dividers on the inside of the spiral which tap off the heavy minerals.

☐ **Jeffrey Manufacturing Co. (413, 415, 419, 423 and 425) J. H. Fulford in charge.** Two MV mechanical vibrating conveyors will be set up for continuous action with a No. 4 electric vibrating pan feeder. An impact crusher called the Rock Buster will be on display as well as an electric vibrating barrel packer in operation. Ventilation engineers will find the Aerodyne Type 12-A mine fan, the 4-ft Aerodyne Junior mine fan, the Universal blower, and the Aerodyne Midget blower of interest. Other equipment on display will include an A-6 post drill, an 8-ft section underground belt conveyor, and belt idlers, chains, and transmission equipment. Ask for copies of Bulletin 826 on the MV mechanical vibrating conveyor, and 827 on the Impact crusher.



New Thor power-feed drifter.

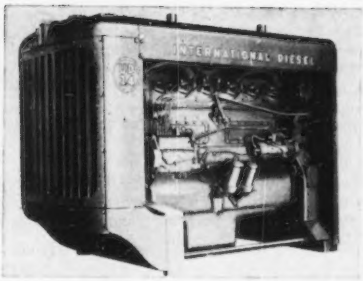
☐ **Independent Pneumatic Tool Co. (232)** Four completely new Thor mine tools will be shown at this booth: (1) The new Thor power-feed unit for drifters with lightweight aluminum sheets in three lengths up to 96-in. feed, and featuring extra sensitive control that practically eliminates carbide top drill steel breakage. (2) The Thor reverse-feed stoper. (3) Thor stoper legs for converting sinker-type drills into stopers. (4) A lightweight 35-lb. sinker rock drill. The display will also include Thor's complete line of rock drills, demolition tools, small pneumatic and electric tools, and sinker legs and pneumatic columns. Staffing the exhibit will be: W. A. Nugent, B. H. Johns, W. B. Hunn, M. A. Sorenson, John F. Corkery, and George Thoma.



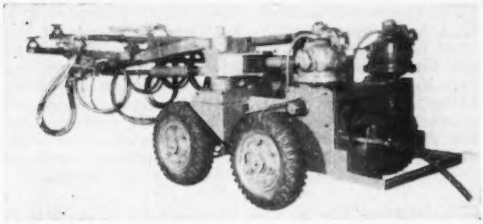
"From power plant . . . to the bottom of the hole"

☐ **Ingersoll-Rand Co. (705, 709, 713, 715, 804, 808, 812, 814) M. L. McCormack in charge.** "From power plant to bottom of the drill hole—Use I-R matched products"—this is the theme of the I-R exhibit which will show what the "matched products" are including: rock drills, new Carset Jackbits, new and lighter drill mountings, improved Jackleg for mounting Jackhamers. Also featured will be the new Type XLE, 2-stage package-type stationary compressor built in sizes from 125 to 350 hp.

Hoists for all purposes ranging from small slushers to mine-shaft hoists will be shown in a *working exhibit of hoists* and will be of special interest to those needing portable air and electric hoists for slushing and other operations. The portable power tool display includes electric and air Impactools, riveters, chippers, grinders, woodborers and paving breakers. Also on display will be a large multi-stage, high-pressure, centrifugal pump and smaller units for general and shaft sinking purposes.



☐ **International Harvester Co. (520) P. D. Evans in charge.** Highpoint of interest in this booth will be a 180-hp. UD-24 sectional diesel engine illustrated here. In addition you will be able to see action photos of I-H equipment. Also ask for information on the TD-24 crawler, the new TD-18A and TD-14A crawlers which are in the I-H line but not exhibited. Information will also be available on full-wheel tractors and other diesel and gasoline engines.



☐ **Joy Manufacturing Co. (333, 329, 428 and 432) R. E. Campbell in charge.** The accent is on new equipment at the Joy booth. Here you will see the following products which have been introduced recently: (1) The rubber-tired self-propelled Drillmobile shown above. (2) The rubber-tired, self-propelled 17-HR continuous-type loader which employs the gathering arm and conveyor principle used in coal mining. (3) The S-91 stoper with telescopic feed leg. (4) Two new portable air hoists. Other items of Joy's line to be on display will be: "Silver Streak" rock drills, slushers, portable hoists, core drills, fans and blowers, air compressors, rock bits, core bits, electrical connectors, and scraper buckets.

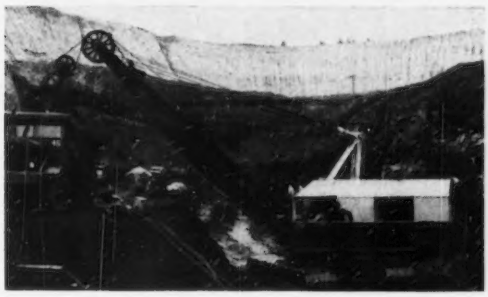
☐ **Jones & Lauglin Steel Corp.** (517) "If you must gamble, gamble on a sure thing, play J&L" is the theme here and to back it up they will have a "one-armed bandit" that pays off in chances for a prize. Featured at the booth will be a graphic display of case histories of outstanding service records of J&L precision-built wire rope and Jalloy treated steel plate. Application of J&L tubular products to mining will also be shown.

☐ **Kennametal, Inc. (509) Richard L. Farris in charge.** Two new products will be stressed in this booth: (1) A three-point Kennametal cemented-carbide rock bit that drills ravelly ground, and (2) a chopping bit with six Kennametal blades that chops through tough formations and returns good samples. Other items on display will include rotary bits for drilling nonmetallics, machine tools, and cemented carbide applications for wear resistance.

☐ **A. Leschen & Sons Rope Co. (134) H. L. Waltman in charge.** A stop at this booth will give you the opportunity to obtain information on "Hercules" Red Strand wire rope and flat laced wire rope slings.

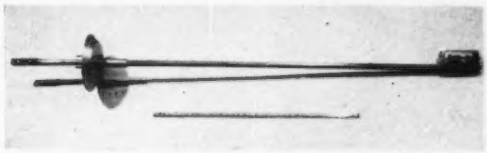
☐ **Le Roi Co. (300)** The company's new 2 to 1 patented air feed light wagon drill will have its first showing here. They also will exhibit their full line of mining equipment, including the fully air powered Cleveland MDR jumbo and the Cleveland S11S stoper so successfully used in mine roof bolting.

Representatives at the show will be R. R. Morgan, vice-president and general manager (Cleveland Div.); N. M. Sedgwick, manager of compressor sales; Ray Rodolf, special representative; W. J. Briney, Butte district manager; and E. G. Simmons, sales engineer.



3-cu. yd. Lima shovel

☐ **Lima-Hamilton Corp. (619) Roy Wills in charge.** In the words of Mr. Wills this booth "will be arranged for the comfort of all visitors." The display will include photographs of Lima equipment in natural color.



New jet-piercing blowpipe

☐ **Linde Air Products Co. (20) O. H. Davenport in charge.** The spotlight is on jet piercing. Here's your chance to inspect and ask questions about one of mining's newest tools.

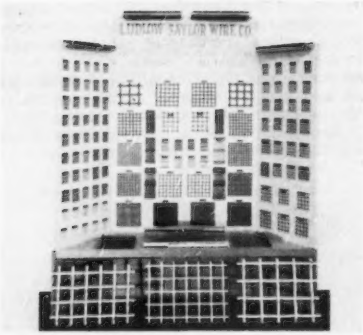
You can also find out a lot about oxy-acetylene welding and cutting equipment for construction, maintenance and repair. Included will be displays of Oxweld, Purox and Prest-O-Weld, blow pipes, nozzles and tips. Up for discussion too, is how the flame-gouging process can help in mine maintenance. Some good literature will be available on these Linde processes and products.

☐ **Link-Belt Co. (222)** Theme of the Link belt exhibit will be conveying and processing equipment. You will see suspended type vibrating screen in action; an arrangement of belt conveyor troughing idlers; a herringbone gear drive with the upper portion of the housing of plastic to show the mechanism. Ball and roller bearing pillow blocks and other transmission units will be on display.

Experienced specialists who will be glad to consult with visitors are D. E. Davidson, vice president; L. O. Millard, H. V. Eastling, J. F. Strott, B. K. Hartman, H. A. Garland, W. W. Muehl and E. H. Bugbee.

☐ **Link-Belt Speeder Corp.** (228) A fully operating one-inch scale model of a K-375 shovel-crane will be hard at work here. The model will strip simulated overburden with a dragline attachment and dig and load "ore" with a shovel attachment.

Attending the show will be D. W. Lehti, president; G. H. Olson, vice president; R. B. Barnes, sales manager; D. F. Van de Roovaart and N. V. Chehak.



☐ **Ludlow-Saylor Wire Co. (126) R. R. Peterson and J. F. Steffens in charge.** Chances are you will be surprised at the variety of metals and alloys in which wire cloths and screens can be supplied. Here you can also find out which of the many types of screen style will best suit your purposes. On display will be a wide variety of Super-loy screens and cloths, designed to withstand abrasion, vibration and fatigue on high speed vibratory equipment.

☐ **Mack Trucks, Inc. (501)Pierce Fleming in charge.** Mack will show you a truck so big that you will have to go outside the main hall to see it. It's the giant Model LRSW, a 30-ton, 6-wheel, off-the-highway, dump truck, powered by a 300-hp. diesel. Be sure to ask for the booklet (shown here) which tells all about this monster, with its balanced bogie, double plate air-assist clutch, 8-speed duplex transmission and hydraulic steering.

☐ **Marion Power Shovel Co. (125) Robert J. Lick in charge.** Drop in here to see a working scale model of a type 7400 walking dragline. Built to a scale of approximately one inch to one foot, the model has a boom 183 in. long; the upper deck is 31 in. wide and 54 in. long. The bucket is 7 x 9 x 5 in. It operates on exactly the same principles as the Marion giant.

☐ **Mine Safety Appliances Co. (201) D. F. McElhattan in charge.** The highlight here will be MSA's new Maskfone which permits direct telephone contact between wearers of gas masks or breathing apparatus over short or long distances. Powered by the speakers voice, no batteries or other power source are needed. Other items of interest will be the Chemox with speaking diaphragm, cartridge powered stud driver, rail punch and cable splicer. You will also be able to see Mine Safety Appliances' complete line of oxygen breathing apparatus.

☐ **Mine & Smelter Supply Co. (128) C. G. Willard in charge.** This is the place to inspect the Masseo Circuitron, an electronic instrument to automatically maintain any grinding circuit at its optimum point by controlling the rate of new feed to the grinding mill, regulating the classifier sand load and maintaining a constant density of the classifier overflow.

☐ **Morris Machine Works. (718) W. H. Pfarrer in charge.** The Type "R" slurry pump containing only four principal wearing parts will be featured at this booth. Ask for Bulletin 181.

☐ **Morse Brothers Machinery Co. (510 and 512) Representatives** of the Morse Bros. company, well known for its "Jetair" flotation machine, will be glad to see you in their booth in Building 11.

Shock absorber stops cable breaks

☐ **Mosebach Electric & Supply Co. (714) John C. Loy, L. C. Burry, and N. F. Wetzel in charge.** If you want to know what's new in trolley and track products, ask the representatives at this booth to show you the new Mesco shock absorber, the Mesco Hydraulic brake adjuster, and the Mesco clamp-type trolley tap which will be on exhibit—also the Mesco heavy-duty feeder switch. The easily attached shock absorber shown above takes up sudden jerks on trailing cable equipment such as shuttle cars, loaders, etc., and prevents cable breaks.

☐ **National Electric Coil Co. (500) D. W. Hatfield in charge.** Products to be featured at this booth will include windings for electric motors and generators and other electrical equipment and supplies. Have your chief electrician check this booth for a visit.

☐ **National Malleable & Steel Castings Co. (422) Herb H. Smith in charge.** In addition to displaying Willison automatic couplers for all types and sizes of mine cars, the exhibit will feature two new specialties. The national NC-1 truck for high speed mine cars, is designed to reduce impact on the road bed and decrease spillage. Rubber-cushioned draft gears, the other specialty, provides shock absorption and high capacity in a limited space.

Other products will be swivel hitching, plain link hitching and Naco cast steel wheels. The company will also show its cast steel sinter pallets and Mallix sintering bars, as well as ore grinding balls produced by its subsidiary, the Rotary Steel Castings Co., of Denver.

☐ **National Tube Company (318) See item under U. S. Steel Corporation.**

☐ **Nordberg Manufacturing Co. (118) Harold N. Propp in charge.** The Nordberg booth is designed primarily to give guests a place to relax and discuss their operating problems with company representatives. In attendance will be H. M. Zoerb, chief engineer; G. E. Jarpe, Northwest district manager; T. E. Davis, Western district manager (Crusher Div.); T. Wiedenhoefer, Hoist & Process Machinery Department sales manager. Plan to stop in here and find the answers to some of your hoisting and milling problems.

☐ **Ohio Brass Co. (334) J. H. Sanford in charge.** If roof support is worrying you, be sure you make a call here and find out about the roof support expansion shell and plug. In addition, there will be on exhibit safety and control materials, trolley fittings, rail bonds and collection equipment.

☐ **Osgood Co. (817) Frank L. Johnson in charge.** Literature, advice and explanations will be forthcoming here on Osgood and General Excavating Co.'s lines of power excavators and material handlers from ⅜ to 2½-cu. yd. capacity.

☐ **Osmose Wood Preserving Co. (617) Dan Kamphausen in charge.** Mr. Kamphausen will be happy to show you specimens of Osmose-treated mine timber after many years of service as well as samples of Osmose timber preservatives for mining. Photographs and technical files will be available on all phases of mine roof support with the spotlight on the demonstration of the Osmose wooden mine roof plug. You will have access to complete cost data, plant models and descriptive literature.

☐ **Pioneer Engineering Works (140) Nick Savage and C. T. Hendrickson in charge.** Heavy-duty feeders, crushers, screens and conveyors will be featured at this booth. Cutaway and working models of jaw crushers, roll crushers, manganese steel apron feeders, and conveyor idlers will demonstrate construction and operating principles. N. J. Knickerbocker and C. T. Hendrickson will be on hand to answer your questions.

☐ **Pittsburgh Gear Co. and Ottumwa Iron Works (701) Eddie R. Phillips in charge.** You ought to make sure your master mechanic sees this one too. Highlighted will be the Sykes continuous tooth herringbone gear and speed reducer, taper serrated shaft and pinion, guaranteed armored products plus a complete line of mining replacement parts for loaders, cutters and locomotives. There will also be mining hoists manufactured by Ottumwa Iron Works.

Literature on the above products will be available.

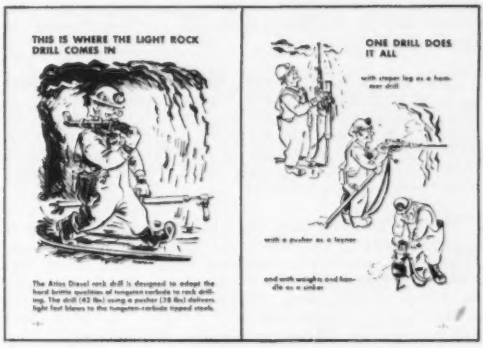
☐ **Raybestos-Manhattan, Inc. (130) A. L. Hawk in charge.** Two eye-catching new products at this booth will be the Ray-Man conveyor belt for high tension and long lifts, and the new heavy-duty Homoflex air and water hose, with tough rubber covering to withstand abrasion and impact. Other items for your inspection include Homocord and Whipwire conveyor belt, Condor compensated transmission belt, Condor Homoflex kinkless hose and Buronik fire resistant trolley wire guard.

☐ **John A. Roebling's Sons Co. (306) Eugene Urban in charge.** Not only will you be able to see the following products at the Roebling booth, but you will be able to get some top notch catalogs on them. The items are wire rope, wire rope fittings and slings; electrical wire and cable, trolley contact wire, bare and weather proof wire, power cables and mining machine cables; and aggregate wire screens, screen surfaces for sizing and metallic filter cloths.

Rok-Bit Gage

Rok-Bit Insert

☐ **Rock Bit Sales & Service Co. (719,818) John Neamand in charge.** Here are some new products worth checking up on: Hole-Saver—a tool to retrieve broken steel and lost bits; air-operated Knock-Off Blocks for removing one use bits from the steel; gage for checking angle of carbide when regrinding bits. Other products for "taking drilling out of your headache department" are Rok-Bit crown carbide bits, intraset steel and percussion type tungsten-carbide drills for use with electric or air operated hammers.



See the light Atlas drills

☐ **Sandvik Steel, Inc. (917) Messrs. Kindahl and Mortsell in charge.** This booth presents a combination of equipment that has widespread popularity, particularly in eastern Canada, the Atlas Diesel lightweight drill and Sandvik Coromant tungsten-carbide tipped drill steels. Other products on display are Atlas Diesel pneumatic hammers and auxiliary equipment and the Sandvik Coromant rock drill grinding machine.

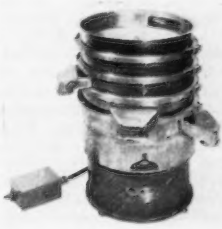
Be sure to ask for literature on these products.

☐ **Sheffield Steel Corp. (504) George P. Lacy in charge.** Sheffield's booth will feature the "Moly-Cop" special alloy grinding balls which differ from ordinary carbon steel balls because they offer a fine hard martensitic structure right down to the core of the ball. If you want to know how this will result in lower grinding costs, ask the representatives of Sheffield to explain.

☐ **Simplicity Engineering Co. (237) R. C. Johnson in charge.** Simplicity will display its latest type 4x14-ft. horizontal two-deck screen which is particularly adaptable for dewatering of sludge and fine sizing of ores and coal. Paul Barton and A. H. Patten of the Simplicity staff will also be on hand to point out the advantages of the unit.

☐ **Socony-Vacuum Oil Co., Inc. (821)** Representatives of the company will be glad to discuss your lubrication problems pertaining to mines and mining machinery. Stop in here to get the latest useful information on rust preventatives.

☐ **Southwestern Engineering Co. (623) J. Lowe in charge.** Ask the SWECO representative to show you the new Vibrating screen separator shown above, also for a copy of bulletin 906 which shows the construction of the unit in clear detail. SWECO will also feature their factory built HMS plant, completely described and illustrated in Bulletin 902 which will be available. This bulletin contains two useful graphs on density relations of magnetic suspension media including magnetite and ferrosilicon.



☐ **Stearns-Roger Manufacturing Co. (818) D. L. Clow in charge.** If you have been doing your own plant designing and construction, stop in here and see whether you wouldn't be better off by employing the services of the Stearns-Roger company which specializes in plant engineering, equipment manufacturing, and plant construction for the mining industry. Information will also be available on Meehanite metal parts and equipment for the mining industry.

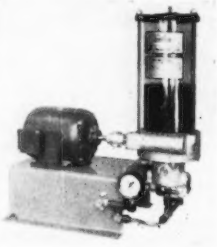
☐ **W. O. & M. W. Talcott, Inc. (716) G. Wilson Little in charge.** This booth will offer some answers to your transmission and rubber conveyor belt problems. Talcott will exhibit its complete line of belt fasteners. Also pay special attention to the Talcott Acme Patch fasteners designed to repair those ripped or damaged belts that hold up production.

☐ **The Tamping Bag Co. (124)** Effective tamping is one way to cut explosives costs, so stop in here to inspect the seal-tight Tamping Bags made from wet strength paper which deteriorates very slowly in humid atmospheres. This booth will also feature weed and brush killers which will be useful in keeping the mine yard and right-of-way areas sightly and unobstructed.

☐ **Tennessee Coal, Iron & Railroad Company (318) See item under U. S. Steel Corporation.**

☐ **Timken Roller Bearing Co. (233) W. G. Turner in charge.** If you haven't seen Timken's new Spiralock single-pass bit yet, you will have a chance to do so at their booth. This bit together with their threaded multi-use and threaded tungsten-carbide insert bits completes the Timken line of all-purpose rock bits. (Ask for their booklet shown above.) Excellent literature for your files will also be available on Timken alloy steel and seamless tubing; Timken tapered roller bearings with specific applications in mining machinery of all types; and a booklet "New Rock Bits for Old" which tells how to recondition bits by hard grinding, soft grinding, or hot milling.

☐ **Trabon Engineering Corp. (612) Wilbur Deutsch in charge.** Trabon's line of manual and automatic oil and grease lubrication systems will be exhibited, with special emphasis on units suitable for crushers, shaker screens, and other equipment operating under wet and dirty conditions. One mechanically driven model and two motor-driven models (see illustration) will be in actual operation in the booth. Charles Spencer and Ray Nelson will also be on hand to tell you more about the Trabon line.



☐ **Traylor Engineering & Manufacturing Co. (601) C. H. Roberts and A. C. Most, Jr., in charge.** Traylor's line of crushers, ball mills, rod mills, tube mills, rotary kilns, driers, and cookers is too massive to ship to the show, so special provisions have been made to show the line pictorially. A projector will be available to show you actual field installations and point out unique design features of Traylor units. Bulletin 4120 shows their complete line of equipment for mining, milling and smelting.

☐ **W. S. Tyler Co. (604) E. M. Graham in charge.** The accent in this booth is on screens, including the Ty-Rock mechanically vibrated screen, samples of woven wire screen, the Ro-Tap Testing sieve shaker, and standard Tyler screen scale testing sieves.

☐ **Ultra-Violet Products, Inc. (622) Thomas S. Warren in charge.** The following new products will be on display here: Model SL Mineralights (long-wave and short - wave ultra - violet lamps); and Model B-50 long-wave Mineralight lamp. The new SL lamps are 10 lb. lighter than earlier models and cost less.

☐ **United States Steel Corp. (318) Robert G. Hill in charge.** Mine plant and equipment designers will want to stop in here to find out which steel is best for specific purposes. For instance, USS Cor-Ten and USS Man-Ten are low-alloy high strength steels suitable for mine cars, skips, and cages. Ask the specialists at this booth about abrasive resisting and USS Tri-Ten steels also to be featured. Additional information will be available about Tiger Brand wire ropes, aerial tramways, electric cables, and National underground pipe.

☐ **United States Steel Supply Company (318) See item under U. S. Steel Corporation.**

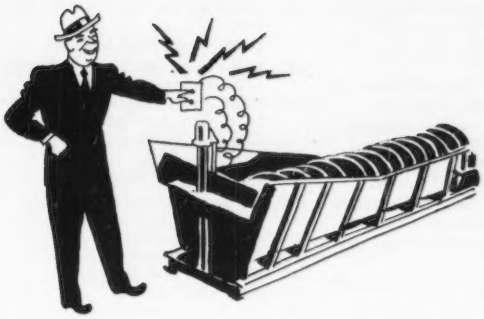
☐ **Victaulic Company of America (106) R. W. English in charge.** Units operating under air and water pressure will visually demonstrate Victaulic's slogan, "The Easiest Way to Make Pipe Ends Meet." On exhibit will be the line of pipe couplings from ¾ to 60 in. in diameter with fittings and accessories.

Two new products well worth examining are (1) a new simplified header complete with plug valves for hose take-offs, and (2) a motor driven portable pipe machine for simultaneously cutting and grooving new or salvaged pipe, ¾ through 2-in. sizes.

☐ **Western Cartridge Co.—Division of Olin Industries, Inc. (328 and 330) A. J. Barocca in charge.** The Western Cartridge line of blasting caps, explosives, etc., will be highlighted here.

☐ **Western Rock Bit (521) See Calumet & Hecla.**

☐ **Westinghouse Electric Corp. (105, 111, 204, 210) J. R. Fulton and R. N. Anderson in charge.** This display will show graphically how type AB De-ion circuit breakers can be applied to open-pit and underground distribution systems to provide ground-fault and short-circuit protection—thus protecting personnel and equipment. You will also see a cutaway Life-Line motor and a splashproof model operating under a stream of water; a new type control center employing Life-Line starters with a tilt-out disconnect position; metallic rectifiers for battery charging—also selenium rectifiers used in Cottrell precipitators; Life-Line gear motors; a complete line of push-button stations; a glass-covered SH speed reducer permitting you to see the unit in operation; and numerous items for trolley installations, industrial lighting, and panel instrumentation.



sand pump. Just to make sure that you enjoy your visit, a "Mill Game" will be an added feature which will test your knowledge as to the name and location of about 125 mining companies in the U. S. A. Useful literature on the above items will be available at the WEMCO booth.

☐ **Worthington Pump and Machinery Corp. (129 and 133) P. H. Nast in charge.** This extensive exhibit space will display Blue Brute drifters, stopers, hand-held rock drills, air tools, a UMW-40 wagon drill, and models of the Blue Brute self-priming centrifugal pumps. Mult-V drives, a Unabloc vertical air compressor, and a Monobloc pump will also be shown. Slides and photographs will illustrate the company's air conditioning and refrigeration equipment, steam turbines, electric motors, diesel engines and stationary compressors.

☐ **Western Machinery Co. (429 and 437) R. W. Hernlund in charge.** The WEMCO exhibit will contain a SH classifier of commercial size, arranged in operating position and wired so that you may operate the triple-pitch spiral, and hydraulic lifting device. Millmen who have heard about the advanced pitch but haven't seen it yet will now have a good chance to examine it. Other interesting items on display will include a commercial size Fagergren flotation machine with cutaway rotor-stator mechanism; a second Fagergren cell operating to illustrate the agitation and dispersion principle; a plastic model Wemco Heavy-Media Separation unit in continuous operation to illustrate the HMS process (operating at a rate of 200 lb. of ore per hr.); and a WEMCO centrifugal

☐ **Willson Products, Inc. (609) S. C. Herbine and Earle Seares in charge.** Safety engineers take note—A complete line of eye and respiratory protective devices will be featured at this booth.

Index of Products Featured at the Show

IF YOU WILL NOT BE able to attend the Salt Lake City show, and would like more information on the products featured there, use this classified product index as a guide. Write down the index numbers of the items in which you are interested on the convenient postcard opposite page 142. Mail it to E&MJ. Your request for more information will be forwarded to the respective exhibitors.

GENERAL MINING AND SMELTING EQUIPMENT AND SUPPLIES

CONSTRUCTION EQUIPMENT

1. Lifting jacks for mining and construction work. **The Buda Co.**

CONSTRUCTION AND ENGINEERING SERVICES

2. Plant engineering for the mining industry.
3. Equipment manufacturing for the mining industry.
4. Plant construction for the mining industry.
   Stearns-Roger Mfg. Co.

COMPRESSORS

5. Type XLE, 2-stage package-type stationary compressor.
   Ingersoll-Rand Co.
6. Unabloc vertical air compressor.
   Worthington Pump & Machinery Corp.

CONVEYOR EQUIPMENT

7. Mine belt conveyors.
   Barber-Greene Co.
8. Belt lacing, fasteners, cutters.
   Flexible Steel Lacing Co.
9. Ore-type mine conveyors.
   Hewitt-Robins, Inc.
10. MV mechanical vibrating conveyors.
11. Underground belt conveyor.
    The Jeffrey Manufacturing Co.
12. Conveyor troughing idlers.
13. Rubber-tread impact training.
    Link-Belt Co.
14. Ray-Man conveyor belt for high tension long lifts.
15. Whipwire conveyor belt.
16. Homocord conveyor belt.
    Raybestos-Manhattan, Inc.
17. Belt fasteners for conveyor belts.
18. Acme patch fasteners for repairing conveyor belts.
    W. O. & M. W. Talcott, Inc.

DIESEL ENGINES

19. Supercharged diesel engines for trucks and off-highway use.
    The Buda Co.
20. 150-hp. Model JS-600 diesel engines.
21. 300-hp. Model NHRS-600 diesel engines.
22. 550-hp. Model NVHS diesel engines.
    Cummins Engine Co., Inc.
23. Diesel engines equipped with "6-110" torque converters.
    Detroit Diesel Engine Division. General Motors Corp.
24. Hercules gasoline and diesel engines and power units.
    Hercules Motors Corp.
25. UD-24 diesel engine—180 hp.
    International Harvester Co.

ROCK DRILLING EQUIPMENT

26. Pacific bit knocker.
    Alloy Steel and Metals Co.
27. Hollow drill steel.
    Bethlehem Pacific Coast Steel Corp.
28. Liddicoat single-pass rock bits.
    Calumet & Hecla Copper Co. Western Rock Bit Mfg. Co.
29. Model G-600 drill jumbo.
    Chicago Pneumatic Tool Co.
30. Alloy drill steel.
    Crucible Steel Co. of America.

30A. Jet Piercing.
    Linde Air Products Corp.

31. Air feed leg.

32. S17U and S48P sinker drills.
33. Hydraulic drill jumbo.
34. HEE drill-steel sharpener.
35. Deep-hole drilling equipment.
Gardner-Denver Co.
36. Thor power-feed unit for drifters with aluminum shell.
37. Thor reverse-feed stoper.
38. Thor stoper leg for sinkers.
39. Thor 35-lb. sinker rock drill.
Independent Pneumatic Tool Co.
40. New Carset jackbits (tungsten-carbide type).
41. Improved Jackleg for Jackhammers.
Ingersoll-Rand Co.
42. A-6 post drill.
The Jeffrey Manufacturing Co.
43. Drillmobile (rubber-tired jumbo).
44. S91 stoper with telescopic feed leg.
45. Hydro-Drill jibs for jumbos.
46. Silver Streak rock drills.
Joy Manufacturing Co.
243. Kennametal carbide bits.
244. Chopping bit with six blades.
Kennametal, Inc.
47. Cleveland S11S stoper.
48. PD25 power-feed drifter.
49. MDR mine jumbo.
Le Roi Co.
50. Hole saver—a tool to retrieve broken steel and lost bits.
51. Air-operated knock-off blocks to remove one-use bits.
52. Percussion-type tungsten-carbide drills.
53. Rock-bit crown carbide bits.
54. Intraset steel.
55. Gage for checking angle of carbide when regrinding.
Rock Bit Sales & Service Co.
56. Atlas pneumatic hammers and auxiliary equipment.
57. Sandvik Coromant tungsten-carbide tipped steel.
58. Sandvik Coromant rock drill grinding machine.
Sandvik Steel, Inc.
59. Timken removable carbide insert, multi-use, and Spiralock rock bits.
Timken Roller Bearing Co.
60. Blue Brute drifters.
61. Blue Brute stopers.
62. Blue Brute hand-held rock drills.
63. UMW-40 wagon drill.
Worthington Pump & Machinery Corp.

DIAMOND DRILLING EQUIPMENT

64. CP-8 gas-driven core drill.
Chicago Pneumatic Tool Co.
65. Underground and surface diamond drills.
66. Core bits, pilot bits, casing bits, concave bits, reaming shells.
Christenson Diamond Products Co.

DRIERS

67. Rotary kilns, driers and coolers.
Traylor Engineering & Mfg. Co.

DUST COLLECTORS

68. Roto-Clone hydro-static precipitator.
69. Roto-Clone dynamic precipitator.
American Air Filter Co., Inc.
70. Dustube cloth bag-type dust collector.
American Wheelabrator & Equipment Co.
71. Van Tongeren cyclone collectors.
72. PMF hopper discharge valve.
73. SF electric precipitator.
Buell Engineering Co., Inc.

EARTH MOVING AND TRACTION EQUIPMENT

74. HD-19 tractor with torque converter.
Allis-Chalmers Manufacturing Co.
75. Renewable lip-type dipper.
American Manganese Steel Division.
76. D7 diesel with Hyster Hystaway.
77. D4 diesel tractor with HT4 Traxcavator.
78. DW10 diesel wheel-type tractor with Athey PD10Q rubber-tired quarry trailer,
Caterpillar Tractor Co.
79. Trucks equipped with torque converters.
Dart Truck Co.
80. New Model UD 10-ton rear-dump truck.
Euclid Road Machinery Co.
81. P&H electric shovels equipped with magnetorque electric clutch.
Harnischfeger Corp.
82. TD-24 crawler.
83. TD-6 crawler.
84. TD18A and TD14A crawlers.
85. TD-9 crawler.
International Harvester Co.
86. Lima type 2400 6-cu. yd. shovel.
87. Lima type 1201 3.5-cu. yd. shovel.
Lima Shovel and Crane Division. Lima Hamilton Corp.
88. Speeder K-375 shovel-crane.
Link-Belt Speeder Corp.
89. Model LRSW 30-ton 6-wheel off-the-highway dump truck.
Mack Trucks, Inc.
90. Type 7400 walking dragline.
Marion Power Shovel Co.
91. Power excavators and material handlers from ¾ cu. yd. to 2.5 cu. yd.
The Osgood Co.

ELECTRICAL EQUIPMENT

92. Ground-Gard and Pow-R-Gard mine distribution systems.
Albert & J. M. Anderson Mfg. Co.
93. New large V-type diesel electric set.
Caterpillar Tractor Co.
94. No. 9074 insulated feeder suspension hook.
The Elreco Corp.
95. Two-shoe magnetic d.c. brake for hoists and cranes.
96. High-voltage air-break contactor for 2300 to 4800 volts.
General Electric Co.
97. Mesco shock absorber for trolley reel units.
Mosebach Electric & Supply Co.
98. Windings for motors and generators.
National Electric Coil Co.
99. Portable power cables and cords with Roeprene sheaths.
100. Bare and weather-proof electrical wire and cable.
John A. Roebling's Sons Co.
101. Electrical cable.
United States Steel Corp.
102. AB De-ion circuit breakers.
103. Control centers.
104. Life-line starters.
105. SH speed reducer.
106. Electrical instruments.
107. Industrial lighting.
108. Life-Line splash-proof motor.
109. Life-Line gear motor.
Westinghouse Electric Corp.

BLASTING AND EXPLOSIVES

110. Mine-Vent rubberized powder bags.
American Brattice Cloth Corp.
111. Atlas No. 4 blasting galvanometer.
112. Plastic insulated blasting cap wire.
113. The Rockmaster "16" blasting system using milli-second delays.
Atlas Powder Co.
114. Milli-second delay blasting caps (MS type)
E. I. du Pont de Nemours & Co., Inc.
115. Explosives for metal mining.
116. Electric blasting caps.
117. No-Vent metal delay electric blasting caps.
118. Short-period delay electric blasting caps.
Hercules Powder Co.
119. Tamping bags which resist high humidity.
The Tamping Bag Co.
120. Explosives.
121. Blasting caps.
Western Cartridge Co.

GEIGER COUNTERS

122. Geiger counters.
Ultra-Violet Products, Inc.

HOISTS

123. Electric hoists—250-lb. to 15-ton capacity.
Harnischfeger Corp.
124. New portable air hoists.
Joy Manufacturing Co.
125. Hoisting equipment.
Nordberg Manufacturing Co.
126. Mining hoists.
Ottumwa Iron Works.

HOSE

127. Heavy-duty Homoflex air and water hose.
Raybestos-Manhattan, Inc.
128. Rubber hose.
Gates Rubber Co.

HAULAGE AND TRACK EQUIPMENT

129. Rocker-dump ore car.
130. Standard type-Z 20-cu. ft. ore cars.
131. Rail turn-out and switch standards.

C. S. Card Iron Works Co.

132. Fused trolley taps.
The Elreco Corp.

133. New 1½-ton storage battery locomotive.
General Electric Co.

134. Mancha's Little Trammer.
Goodman Manufacturing Co.

135. Mesco hydraulic brake adjuster for locomotives.

136. Mesco heavy-duty feeder switch.

137. Mesco clamp-trolley tap.
Mosebach Electric & Supply Co.

138. Willison automatic couplers.

139. NC-1 truck for high-speed mine cars.

140. Naco steel wheels.
National Malleable and Steel Castings Co.

141. Trolley fittings.

142. Rail bonds.

143. Safety and control equipment.
Ohio Brass Co.

144. Buronik trolley wire guard.
Raybestos-Manhattan, Inc.

145. Trolley equipment.
Westinghouse Electric Corp.

LOADING AND SCRAPING

146. Pacific Slushmaster scraper.

147. Pacific sheave blocks.
Alloy Steel and Metals Co.

148. New type RockerShovel loaders for underground and surface.

149. Folding scraper for scram drifts.
The Eimco Corp.

150. 17-HR self-propelled, rubber-tired, continuous-type loader.
Joy Manufacturing Co.

LUBRICANTS

151. Rust preventives.

152. Lubricants for mine machinery.
Socony-Vacuum Oil Co.

153 Mechanical and motor-driven oil and grease lubrication systems.
Trabon Engineering Corp.

PIPE

154. Armco asbestos-bonded pipe.

155. Armco portable pipe for compressed air and water.
Armco Drainage and Metal Products, Inc.

156. National underground pipe.
U. S. Steel Corp.

157. Fittings.

158. Victaulic header (NP).

159. Portable pipe machine.
Victaulic Company of America.

POWER TOOLS

160. Velocity power tools using cartridge for driving studs, punching rails, splicing cables.
Mine Safety Appliances Co.

PUMPING EQUIPMENT

161. Centrifugal sand pump.
Denver Equipment Co.

162. Rubber-lined sand pump.
Allis-Chalmers Mfg. Co.

163. Large multi-stage centrifugal high-pressure pumps.
Ingersoll-Rand Co.

247. Type-R slurry pumps.
Morris Machine Works

164. Blue Brute self priming centrifugal pumps.

165. Monobloc pump.
Worthington Pump & Machinery Corp.

POWER TRANSMISSION

166. Torque converter on HD-19 tractor.

167. Texrope drive and Texslide motor base.
Allis-Chalmers Mfg. Co.

168. Torque converters for trucks.
Dart Truck Co.

169. Torque converter for diesel engines.
Detroit Diesel Engine Division. General Motors Corp.

170. Belt lacing, fasteners, cutters.
Flexible Steel Lacing Co.

171. Vulco rope drives.
Gates Rubber Co.

172. Magnetorque electric clutch for electric and diesel shovels.
Harnischfeger Corp.

173. Herringbone gear drive.

173A. Electrofluid drive.
Link-Belt Co.

174. Schneider torque converter (used on Mack trucks).

175. Mack TRDX-510-8-speed duplex transmission.
Mack Trucks, Inc.

176. Air cushion clutches.
The Osgood Co.

177. Single and double-reduction gear reducers.
Ottumwa Iron Works.

178. Sykes continuous tooth herringbone gear and speed reducer.

179. Tapered serrated shaft and pinion.

180. Armored gears.
Pittsburgh Gear Co.

180A. Condor compensated belts.
Raybestos-Manhattan, Inc.

181. Fasteners for transmission belts.

182. Acme patch fasteners for repairing damaged belts.
W. O. & M. W. Talcott, Inc.

183. Multi-V drives.
Worthington Pump and Machinery Corp.

ROOF BOLTING

184. Mine roof support bolts.
Colorado Fuel & Iron Corp.

185. Expansion unit for roof bolting.
The Elreco Corp.

186. Roof support expansion shell and plug.
Ohio Brass Co.

RUBBER CONSTRUCTION MATERIALS

187. Rubber-lined and rubber-covered material and equipment.
The Galigher Co.

188. Abrasion and corrosion resistant rubber faced, coated and lined materials.
Gates Rubber Co.

SAFETY EQUIPMENT

189. Glass hard-boiled hats.

190. Morenci safety belts.

191. Combustible gas indicators.

192. Roughneck aluminum-alloy safety hat.

193. Unit packet first-aid kits.
E. D. Bullard Co.

194. MSA Maskfone breathing apparatus.

195. MSA Chemox with speaking diaphragm.

196. Oxygen breathing apparatus.

197. Respirators.
Mine Safety Appliances Co.

198. Complete line of eye and respiratory devices.
Willson Products Inc.

SMELTING EQUIPMENT

199. Cast steel sintering pallets.

200. Mallix sintering bars.
National Malleable and Steel Castings Co.

STEEL CONSTRUCTION MATERIALS AND PARTS

201. Steelox buildings for mine construction.

202. Fabricated steel products for mining properties.
Armco Drainage and Metal Products, Inc.

245. Jalloy treated steel plate.

246. J&L tubular steel products.
Jones & Laughlin Steel Co.

203. Meehanite metal parts and equipment for the mining industry.
Stearns-Roger Mfg. Co.

204. A handbook of seamless steel tubing.

205. Timken steel and tube facilities and products.

206. Timken engineering journal showing applications of roller bearings in mining machinery.
The Timken Roller Bearing Co.

207. Abrasive resisting steels.

208. USS Cor-Ten.

209. USS Man-Ten.

210. USS Tri-Ten.
United States Steel Corp.

STORAGE BATTERIES

211. 35-cell C6 nickel-iron alkaline storage battery for locomotives.

212. 30-cell C8 nickel-iron alkaline battery for trucks.
Thomas A. Edison, Inc.

213. Exide Ironclad battery.
The Electric Storage Battery Co.

214. "Z"-plate battery construction.

215. Gould Battery Selector.
Gould Storage Battery Co.

216. Metallic rectifiers for battery charging.
Westinghouse Electric Corp.

TIMBER TREATMENT

217. Osmose timber preservatives.
Osmose Wood Preserving Co. of America.

TUNNELING EQUIPMENT

218. Steel tunnel liner plates.
Armco Drainage and Metal Products, Inc.

ULTRA-VIOLET LAMPS

219. Model S. L. Mineralight.

220. Model B-50 Mineralight lamp.
Ultra-Violet Products, Inc.

VENTILATION EQUIPMENT

221. Brattice cloth.
222. Mine-Vent flexible tubing.
American Brattice Cloth Corp.
223. Corrugated metal structures for mine ventilation.
Armco Drainage & Metal Products, Inc.
224. 12-A Aerodyne mine fan.
225. 4-ft. Aerodyne Junior mine fan.
226. Aerodyne Midget blower.
227. Universal blower.
The Jeffrey Manufacturing Co.

WELDING AND CUTTING

228. Hardface welding rods.
American Manganese Steel Division.
229. Flame Gouging technique.
230. Osweld welding and cutting blowpipes.
231. C-32 Oxweld cutting blowpipe.
232. Prest-O-Lite air-acetylene appliances.
233. Prest-o-Weld Oxyacetylene welding and cutting appliances.
Linde Air Products Co.

WIRE ROPE AND SLINGS

234. Wire rope.
Bethlehem Pacific Coast Steel Co.
235. Wickwire rope.
Colorado Fuel & Iron Co.
242. Precision-built wire rope.
Jones & Laughlin Steel Co.
236. Hercules Red-strand wire rope.
237. Hercules Red-strand flat-laced wire rope slings.
A. Leschen & Sons Rope Co.
238. Aerial wire rope systems.
239. Roebling slings.
240. Roebling wire rope and fittings.
John A. Roebling's Sons Co.
241. Tiger brand wire rope.
United States Steel Corp.

MILLING EQUIPMENT AND SUPPLIES

CLASSIFIERS

250. S. H. Classifer.
Western Machinery Co.

CONDITIONERS

251. Agitator-conditioner.
Denver Equipment Co.

CONCENTRATING EQUIPMENT

252. Weinig laboratory model gravity concentrator unit for water medium.
Colorado Iron Works Co.
253. Laboratory ore-dressing equipment.
The Galigher Co.
255. Counter-current Heavy-Media separator.
Hardinge Co., Inc.
256. Model 24A Humphreys Spiral.
Humphreys Investment Co.
257. Factory built HMS (Heavy-media separatory) plants.
Southwestern Engineering Co.
258. WEMCO heavy-media separation unit and Mobil-Mill.
Western Machinery Co.

CRUSHING AND GRINDING

259. Hydrocone crusher.
Allis-Chalmers Manufacturing Co.
260. Shell liners and grates.
American Manganese Steel Division.
261. High-carbon rods.
262. Forged steel balls.
Colorado Fuel & Iron Co.
263. Tricone mill.
Hardinge Co., Inc.
264. The Rock Buster and impact crusher.
The Jeffrey Manufacturing Co.
265. Massco Circuitron and automatic control for grinding mills.
The Mine & Smelter Supply Co.
266. Ore-grinding balls.
National Malleable and Steel Castings Co.
267. Crushing equipment.
Nordberg Manufacturing Co.
268. Jaw crushers.
269. Steel apron feeders.
Pioneer Engineering Works.
270. Moly-Cop forged alloy grinding balls.
Sheffield Steel Corp.
271. Crushers, ball mills, rod mills and tube mills.
Traylor Engineering and Mfg. Co.
272. No. 4 Electric vibrating pan feeder. **Jeffrey Mfg. Co.**

FILTERS

273. Continuous vacuum filters for metallurgical plants.
The Eimco Corp.
274. Hastelloy corrosion-resistant filter cloth.
John A. Roebling's Sons Co.

FLOTATION EQUIPMENT

275. Sub-A flotation machine.
Denver Equipment Co.
276. Agitair flotation machines.
The Galigher Co.
277. Electric flotation motor.
General Electric Co.
278. Jetair flotation machine.
Morse Bros. Machinery Co.
279. Fagergren flotation machine.
Western Machinery Co.

REAGENT FEEDERS

280. Wet reagent feeder.
Denver Equipment Co.
281. Geary-Jennings samplers.
The Galigher Co.

SCREENS

282. Ripl-Flo screen.
Allis-Chalmers Mfg. Co.
283. Cal-Wic industrial screens.
Colorado Fuel & Iron Co.
284. Concentric action vibrating screen.
Link-Belt Co.
285. Woven-wire screens and wire cloths.
The Ludlow-Saylor Wire Co.
286. Woven wire cloth and screening.
287. Aggregate wire screens.
John A. Roebling's Sons Co.
288. Model OA horizontal double deck Simplicity screen.
Simplicity Engineering Co.
289. SWECO vibratory screen separators.
Southwestern Engineering Co.
290. Ty-Rock vibratory screen.
291. Woven wire screens.
292. Ro-Tap testing sieve shaker.
293. Tyler standard testing sieves.
W. S. Tyler Co.
294. Heavy duty scalper for large rocks (9,000 lb. or more).
Hewitt-Robins Inc.

How to Complete Your Information on New Products

To round out your information on the latest products and equipment available to the mining industry, be sure and consult the index to manufacturers appearing on the following insert. Many of them convey pre-convention information of special interest to mining readers which is published on other pages of this issue.

If you want further information about the items featured by these manufacturers, write the index numbers of these items on the convenient postcards attached to the following page. Send the card to E&MJ, and your requests for additional literature or information will be forwarded to the manufacturers.

Index to Manufacturers Presenting Information On Equipment in Other Sections of This Issue

MANY OF THE manufacturers listed below are presenting information on items to be featured in the show in other sections of this issue. The pages on which these respective announcements appear are given in the index below. Others who will not be exhibiting have equally important equipment information to offer. Hence your attention is directed to the entire cross-section of manufacturers serving the mining industry as listed below.

If you want further information on the products or services featured by these manufacturers on other pages of this issue, write the index numbers preceding the various company names on the convenient post-free postcards provided below, and E&MJ will forward your request to the indicated manufacturers.

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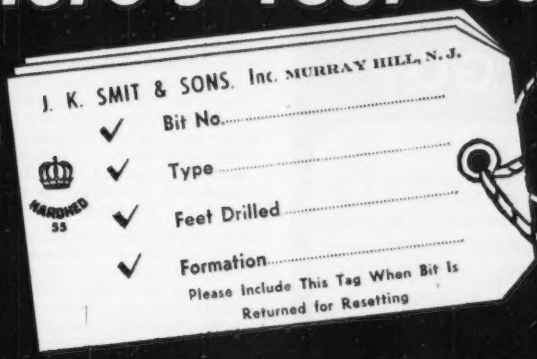
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Composed of small diamond particles bonded in a special tungsten carbide matrix, and is recommended for drilling all formations, but particularly for extremely hard, fine-grained formations, such as massive quartz, quartzite, jasper and taconite where whole stone bits become dull after only a few feet of drilling. This bit is designed to be consumed without resetting.

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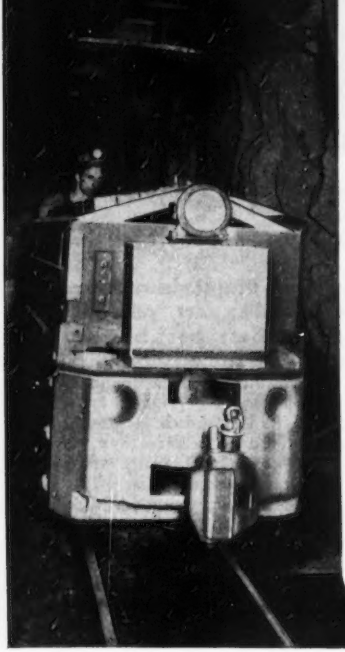

SHREWD MINE operators know that bogged-down locomotives, trammers or shuttle cars bring on blocked right-of-ways, snarled schedules and upped production costs.

They always keep this in mind when buying haulage batteries. Many have found that it is well worth the small extra premium to obtain the long life and dependability of rugged EDISON Batteries. EDISON cells are built of steel inside and out . . . they take temperature extremes, jars, jolts and accidents as part of the day's routine. Case histories show that many of them have fallen down shafts or been in fires or floods . . . and are still hard at work today!

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EDISON

Nickel · Iron · Alkaline

STORAGE BATTERIES

Typical Trammer Battery

Nevada *(Continued)*

as the heading is advanced. The property is situated near Mina.

★**Development work on a rich strike at Montezuma** in Mineral County has opened up the ore shoot for a distance of 30 ft. The vein averages 18 to 24 in. in width and is being worked in the Eva tunnel by Pacific Buttes Mines Co. Assays are reported to have given high values in gold-silver and lead. The ore was first opened in a winze at a depth of 18 ft. in the Eva tunnel, 308 ft. in from the portal. It occurs in a limestone belt.

★Jack Eckstrom, mining at the old camp of Danville in northern Nye County, made a **shipment of gold-silver ore to the smelter at McGill** early in June. Mr. Eckstrom's new find is up the hill a short distance from the original diggings made by old timers in the 1870's.

★Pansy Lee Mining Co., operating the West Coast mine about 14 miles west of Winnemucca in Humboldt County, has shipped 700 tons of ore to **the McGill smelter** since taking over operations at the mine on Nov. 30. The ore is reported to average $50 to $70 a ton in gold and silver.

★Jack Hansen, of Tonopah, announces that a **two-foot width of good grade shipping ore** has been opened up in a drift on the Green Gold property. The mine is situated at Gilbert, in Esmeralda County. Mr. Hansen is one of the owners of the property. Four men are employed at present and the ore is being stockpiled at the shaft. The operators are considering the possibility of moving in a small mill.

The Green Gold shaft is 100 ft. in depth, but the new ore shoot was discovered at about the 50-ft. level.

★**Development of a placer deposit** at Goldpoint in Nye County, on a lease basis may be undertaken in the near future. The ground is owned by the Goldpoint Mining Co., of California. It embraces 100 acres and was discovered in 1946 by the late Harry DeVotie. A shaft has been sunk to a depth of 45 ft. and values of the ore are reported to have increased with depth from a surface average of $10.50 to $18.50 at the bottom. The Stateline mill operating nearby on a custom basis provides a close outlet for ore produced in the district.

★Ground was broken during June for a **big kiln and other facilities for Basic Refractories, Inc., at Gabbs.** The plant is preparing to manufacture refractories to supply the company outlets west of the Mississippi. The finished products have heretofore been produced at Maple Grove, Ohio.

NEW MEXICO

★The company-owned coal mining town of Dawson has been sold to the

highest bidder, an Arizona contractor. **Phelps-Dodge Co. closed its mines at Dawson** this spring after 50 years of operation. The reason: "No longer profitable."

★**Four new carbon dioxide wells** in Harding County, near Roy, are expected to go into production soon, increasing this state's output of dry ice considerably. Most of New Mexico's CO_2 production is in Harding County. Industrial uses of the gas have multiplied, and the new practice of cloud-seeding to make rain is expected to consume additional quantities.

★**Duval Sulphur and Potash Co.**, fourth operator in the Carlsbad potash district, has collared two shafts at 60 ft., and poured concrete for head frames. Work has been started on a Santa Fe Railroad spur to serve the mine. The State Highway Department has built a road to the mine site and will probably pave it soon. Engineering staff of the Stearns-Roger Manufacturing Co., which has the contract for the engineering and design of the new company's refinery and other surface installations, has moved into Carlsbad.

★**Southwest Potash Co.**, subsidiary of American Metals, has chosen shaft sites for the fifth potash operation in the Carlsbad district. Core drilling for underground conditions will continue until location of deposits, water and quicksand have been definitely determined.

★**All major companies are back in lead-zinc production** in Grant County, principal source of these ores in New Mexico. Kennecott Copper Corp., American Smelting & Refining Co. and United States Smelting, Refining & Mining Co. are the largest operators in the district.

★For the fourth consecutive year, **International Minerals & Chemical Corp. has awarded college scholarships** to two young men at Carlsbad. This year's awards went to Don Thomas Weems, a young GI, employed by the company, and Adron Vick Bannister, 17-year-old Carlsbad high school graduate.

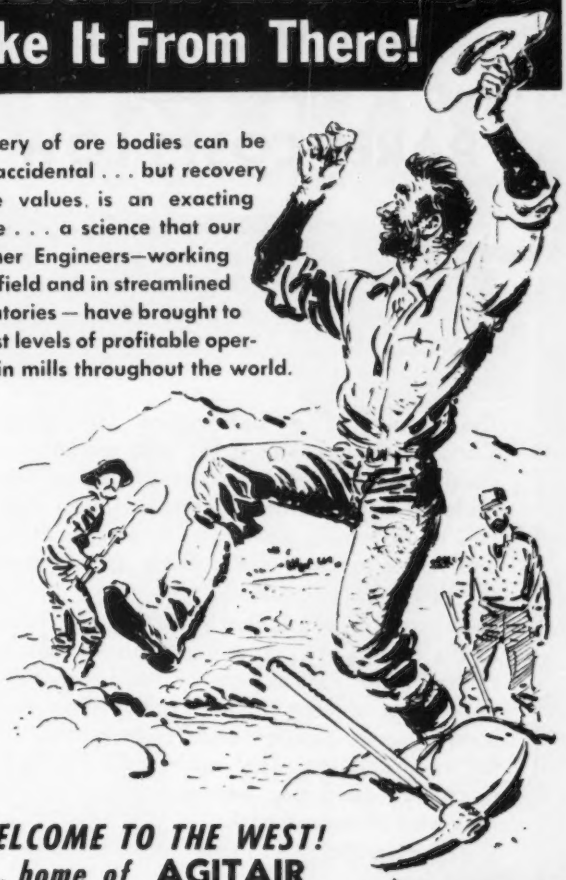
★**Potash Company of America has announced that it will build a $750,000 plant** at Dumas, Texas, to process potassium sulphate, hydrochloric acid and sodium sulphate. The plant is expected to be ready for operation by Jan. 1.

OREGON

★**Production statistics** supplied by all but one of established producers reveal that pumice production in Oregon in 1949 amounted to approximately 169,000 cu. yd. of assorted aggregate and 76½ tons of abrasive grade lump material. Included in the aggregate classification are block and ready-mix aggregate, plaster

GALIGHER ENGINEERS
Take It From There!

Discovery of ore bodies can be quite accidental . . . but recovery of the values is an exacting science . . . a science that our Galigher Engineers—working in the field and in streamlined laboratories — have brought to highest levels of profitable operation in mills throughout the world.



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Oregon *(Continued)*

sand, and a small amount of unprocessed pit-run pumice. The value of the aggregate production is estimated at $276,000. In 1948 production was 170,500 cu. yd. with a value of approximately $305,000.

★**Smithwick Concrete Products, Inc.,** Portland, has received a contract to supply Haydite aggregate for surfacing the decking of the new Tacoma Narrows bridge.

★F. W. Libbey, director of the Oregon State Department of Geology and Mineral Resources, speaking to the Oregon governor's committee on natural resources, disclosed that **oxidized nickel deposits in southwestern Oregon** constitute the largest reserve of this type of ore in the country. He made the statement while warning that America's stockpile of strategic minerals is dangerously low to cope with an international emergency.

★According to the U. S. Bureau of Mines, Grant County ranked first and Baker second in the amount of **metal output in the State in 1949.** Gold production was 11% higher than in 1948. Silver production was 10% below 1948 figures. Zinc was produced for the first time since 1947, with a 6-ton output in 1949. Copper increased tenfold to 20 tons, and lead increased 71% to 12 tons. The five metals were valued at $592,107 or a 12% increase over the valuation of $527,064 in 1948.

★W. S. Robertson and Associates who are leasing the Humdinger gold mine on Williams Creek, in Josephine County, are **cutting quartz lenses** which vary from 3 to 5 ft. in width. They plan to ship the high-grade ore to the Tacoma smelter.

★**The 150-ton flotation plant** at the Independence-Cougar mine, near Granite, has been purchased by the Goldstone Mining Co., and will be moved to the Goldstone mine, near Salmon, Idaho, according to B. W. Porter, of Seattle, company president. The plant has two ball mills, a jaw crusher, two classifiers, and two 6-cell and one 4-cell Denver flotation units.

TEXAS

★**Iron ore and fluxing limestone** were exempted from Texas Railroad Commission's recent 8% increase in intrastate freight rates. The Commission explained that applying the boost to these shipments would put Texas steel mills at a competitive disadvantage with Birmingham plants.

★**Freeport Sulphur Co. offered $52 an acre,** plus royalty, for sulphur rights on 40 acres owned by the state in Culberson County. This is the highest bonus offer in history for a sulphur lease.

TRI-STATE

★**Three outfits are currently producing from shallow deposits** on the Rex land, locally known as the "Thousand Acre Tract."

The Young Brothers are driving a 9 x 9-ft. drift in a deposit of soft ground zinc ore. They will enlarge the drift to 14 x 14 ft. when they get a safe distance from the shaft. The 5 x 5-ft. shaft is 70 ft. deep in ore. Milling 66 tons yielded 10% concentrates, assaying 60% metallic zinc. The mine is located ½ mile east of the Range Line.

F. E. Chambers and A. L. Laoghree are operating a nearby pit, a galena deposit ranging in depth from 6 to 20 ft. They also have a run of lead ore at 60 ft. and a run of lead and zinc ore at 80 ft. The pit is now 15 ft. deep and 20 ft. long. Recently they shipped 1,000 lb. of lead ore, picked by hand.

Frank Dale, Jr., and George Bierid are operating a deposit nearby. They have a 5 x 5-ft. shaft, 20 ft. deep. In 3 weeks of shaft sinking, they sorted and hand jigged 850 lb. of mixed lead carbonate and galena.

★**Senator Elmer Thomas of Oklahoma has proposed a defense area** be set up in Ottawa County, in the Picher mining region. He stated, "I have been assured by our engineers that no place in the nation is there a comparable location for the installation of underground shelter for industry, necessary in our defense, and that shelter could also be provided for a million, or more, of our people."

★Cruzan and Associates are sinking a 5 x 5-ft. shaft on the Mission farm, just east of the Joplin stock yards. The shaft is down 40 ft. The 22-acre lease has been prospected by 9 drill holes which cut about 16 ft. of zinc blende, assaying 15% zinc. The orebody bottoms at 80 ft. and is uniform in thickness, covering 1½ acres.

UTAH

★**Quick-breaking labor difficulties** occurring on or about July 1 served to cripple Utah metals production at a time when industrial spokesmen had expressed belief some measure of labor stability was in the making throughout the state.

The initial blow came when pickets representing the striking Switchmen's Union of North America (AFL), having shut down the D&RGW and Western Pacific Railroads, set up picket lines at the big Garfield Smelter of the American Smelting & Refining Co. Some 1,150 smeltermen refused to cross picket lines, causing a shutdown. Fears were expressed the shutdown might likewise cripple production at the huge Kennecott Corp. properties, employing some 4,500 men at the Bingham open pit and Magna mills. However, Kenne-

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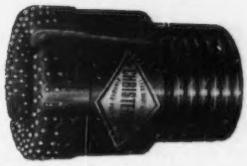

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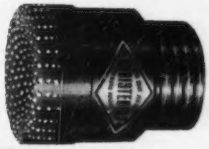

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Utah (*Continued*)

cott maintained production by stockpiling its concentrate, storing some concentrate in rail-cars that normally move daily to the Garfield smelter. How long Kennecott could maintain operations was, however, open to conjecture.

Robert D. Bradford, general manager of the Utah Department, AS&R, reported (July 4) that AS&R and Kennecott would seek the aid of federal agencies and Utah Congressmen "to end our unwilling participation in the strike." Members of the Switchmen's union offered to withdraw their pickets, thus permitting plant workers to enter the Garfield Smelter, but Mr. Bradford pointed out: "The offer could not accomplish anything, since we cannot work unless we can actually switch cars."

The situation delayed completion of the AS&R's $3,500,000 copper anode plant, which was in partial operation before the walkout. F. H. McGraw Co., the construction company, was forced to withdraw a 100-man crew from the job. The new plant had begun initial runs of anode sheetings a few days before (see below).

Meanwhile, CIO Steelworkers, after a 700 to 238 vote, struck United States Smelting, Refining and Mining Co. properties at Midvale, Lark and Bingham, idling 1,200 men employed at the Midvale smelter and the Lark and Bingham mines. The shutdown meant a daily pay roll loss of $12,000. According to Oscar A. Glaser, company industrial relations manager, USSR&M had offered to renew its former contract and provide a pension plan. The union sought a general wage increase, new overtime pay treatment and shift differentials, plus an additional paid holiday. Union spokesman George Wilde said the union sought a wage pattern similar to that established at Pioche, Nev., where a recent contract gave workers an 8-cent per hour boost plus social insurance.

The shutdown of the Midvale smelter threatened further complications, until W. H. H. Cranmer, president of the New Park Mining Co., announced that Park City lead-zinc-silver ore produced by his firm would be processed by the International Smelting & Refining Co. until the end of the walkout.

★**A 30-day extension of contracts** due to expire July 1 has been agreed to by the United Steelworkers of America (CIO) and representatives of New Park Mining Co., Park Utah Consolidated Mines Co., Chief Consolidated Mines Co. and North Lily Mining Co. According to union spokesman George Wilde, additional time was needed for negotiations.

★The Filtrol Corporation of Los Angeles, a subsidary of the Standard Oil Company of New Jersey and Atlantic Refining Co., will definitely go ahead with construction plans for a $2,500,000 mill to be located at 1710

S. Redwood Road, Salt Lake City. The operations, using Utah halloysite clay for the manufacture of oil refinery catalytic agents, is expected to require up to 2 acre-ft. of water per day. Clay will be obtained from the Eureka district.

★The New Park Mining Co., with workings at Park City, Utah, **is seeking to market halloysite clay** being developed at its properties, according to W. H. H. Cranmer, New Park president. Preliminary discussions have been held with the Filtrol Corp. In its 1949 report, New Park disclosed development work in the Park-Bingham tunnel on a halloysite clay deposit.

★Operators in the Topaz district near Delta, Utah, report **considerable advances in fluorspar mining since 1947.** The Ward Leasing Co., stockpiling for the Geneva Steel Co., reports underground mining production of 200 tons weekly. Geneva, a U. S. Steel subsidiary, is using some 8,000 tons of fluorspar annually. Prices for the fluxing material run up to $25 a ton, with premiums for a low silica content. Ore in the Ward leases runs a reported 80-95% purity.

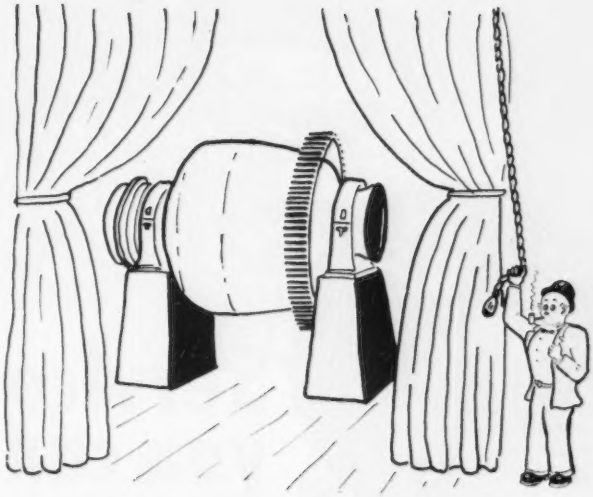
Other operators include Willden Bros., Chesley & Black and Fred Statts, all of Delta, Utah. Topaz district reserves, although not estimated, are reported "large." Some operators are shipping a reported total of 15-20 cars monthly to the Continental Ore Co. in Chicago. Such shippers are reported receiving $16-$20 per ton, with the purchaser paying freight.

★The U. S. Bureau of Mines has announced in Salt Lake City that **prospectors and miners in Utah's Marysvale district can now obtain expert assistance on identifications of ore samples** through a new federal service. Due to the large number of uranium ore samples being submitted from the Marysvale region, a government mineralogist-miscroscopist is now stationed at the Marysvale ore buying depot Friday of each week.

★Pulmic Mines Co. has let contracts for the sinking of an incline on its Jeepster No. 3 claim near Marysvale, according to President Paul H. Hunt. The incline will be driven to a point where monazite is expected, after which, a crosscut will be dug, possibly from an entry point some 350 ft. down the mountainside.

WASHINGTON

★**Federal Government attorneys** have asked for a 30-day extension of time in which to file a brief replying to a $1,265,000 suit brought against the Government January 31 in Washington, D. C., by the Central Eureka Mining Co. The suit is a test case against the War Production Board order L208, which shut down gold mines during the war. Central Eure-



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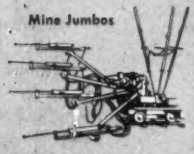

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Washington *(Continued)*

ka's Sutter Creek mine was affected by the order, and the company seeks maintenance costs during the shutdown and rehabilitation expenses. Through Attorney Philip Barnett the company contends that the action was taken arbitrarily "without due process of law" and violates the Fifth Amendment.

★**Chewelah Eagle Mining Co. is sinking a double compartment shaft** on the ledge of its lead-silver property northeast of Chewelah, according to Dr. S. P. McPherson, manager. A promising vein of ore has been exposed by bulldozing, stripping and excavating.

★Earl Garber, president of Northwest Magnesite Co., has reached an agreement with his employees which provides for **a pension plan** similar to that of the large steel companies and their employees. It provides for a guarantee of $100 per month for those working the required length of time, the company paying the difference between what the worker gets in social security benefits.

★**Samples from surface excavations at the Big Iron mine,** 14 mi. northeast of Orient, have revealed gold values to $13 a ton. Although it was known that copper and gold were present in the ore when the property was being worked from 1924 to 1937, no attempt was made at that time to recover these metals. Bulldozers have been used to expose the bedrock. Trenches are being excavated in several directions from the central open iron pit. Drilling and blasting will proceed to reach bedrock.

★**The sample of ore** from Mrs. Grace Melick's ranch on the Olympic Peninsula near Port Angeles which assayed about $124 of gold to a ton caused a short-lived gold fever. Two later samples assayed by the same laboratory, Lambert & Lent of Seattle, showed gold values of only $1.50 and $2.21 a ton.

★Grandview Mines, Inc., whose mine near Metaline Falls is being operated by American Zinc, Lead & Smelting Co. of St. Louis, **received almost $50,000** as its 50% share of profits so far this year, according to its monthly report to directors in June. During May 20,004 tons were milled with Grandview's share of the profits being $13,673.

★**A blanket of solid ore 27 ft. thick** has been uncovered at Bananza Lead mine, 14 mi. north of Colville, Norman Lindsley, chief engineer reported. A 500-ton sink and flotation mill will be constructed. Development is continuing at the Old Dominion, 7 mi. east of Colville, and the millsite is centrally located between the two mines.

★**The State produced 830 tons of lead** in April, compared with 800 tons in March. The monthly average for 1949 was 517 tons.

★**Lewis P. Larsen, president of Pend Oreille Mines & Metals Co.,** said in June that the company would have the first 800-ton unit of its new mill operating by September. He also reported that the company's subsidiary, across the Canadian border from Metaline Falls, the Reeves-MacDonald, was scheduled to reach production of 30,000 tons a month by September 1.

★**An exploratory program** is being planned by Columbia Lead & Zinc Mining Co. of Spokane at its property just south of Z Canyon in the Metaline district.

★**Golden King mine,** three miles south of Wenatchee, is producing 100 to 150 tons of ore daily, the Wenatchee Daily World reports. The gold content covers only mining and freight costs, but it is the silica content which is profitable, being used in smelting copper concentrates. About one-half of American Smelting & Refining Co.'s 5,000 to 10,000 tons of silica used per month at its Tacoma smelter as a flux is said to come from the Golden King. E. H. Lovitt, Vancouver, B. C., engineer in charge, is limiting production to zones where the gold content is above average.

★John R. Cooper, directed by Albert E. Weissenborn, in charge of the USGS Spokane office, has made a **report on Western Molybdenum Co.'s** copper and molybdenum deposit near Chewelah in Stevens County. There are steeply dipping veins in monzonite and marble, with molybdenite, pyrite, chalcopyrite, scheelite and some quartz. Ore shoots from a few inches to 4 ft. wide and up to 130 ft. long are found in the main vein which carries 1% molybdenum sulphide, 1% copper and .15% tungsten oxide.

★**Operations have been resumed at Gold Bond Mining Co.'s** property in the Cascades. Work is being done through the Stoner tunnel in its Olympia mine and the ore will be treated in the renovated Suckling mill. Ores from the Pole Pick mine are milled at the Colton mill. Plans are being made for diamond drilling the Big Red vein structure at the Olympia.

★The Culver claim, said to be **one of the richest gold producers in the Cascades,** has been examined by Gold Gulch Mining Co. Ludwig & Eastwood are developing the Sunny Boy in the same district.

★**AS&R is acquiring the Van Stone property in Stevens County** comprising 14 claims. Values at the property are in zinc and lead and some silver and gold. Development work was dropped in the 1930's. Exploration work is progressing in the form of a drilling program. J. E. Berg, company representative at Wallace, Idaho, said open-pit operations were being considered but that the configuration of the ore and the depth of the overburden would be the determining features. A. N. Mastrovich is the engineer in charge at Northport.

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IN CANADA

• Cobalt Camp Seen Stirring

• Courts Uphold Granby Consolidated

★**Aided by devaluation,** and expanded by increased production from the base metal mines, Canadian gold production is running well ahead of 1949, in spite of rising costs. Preliminary estimates for the first six months of 1950 suggest an output well over 2 million ozs. Official figures for the first quarter reached 1,088,000 ozs., compared with 960,000 ozs. in the same quarter of 1949, gains being registered in every gold-producing province and territory. The rate of improvement, however, may be expected to slow down in the closing months of the year, as production in the fall of 1949 was bolstered by devaluation and by new output from East Sullivan and Quemont. No factors to provide corresponding impetus are in sight for the second half of 1950.

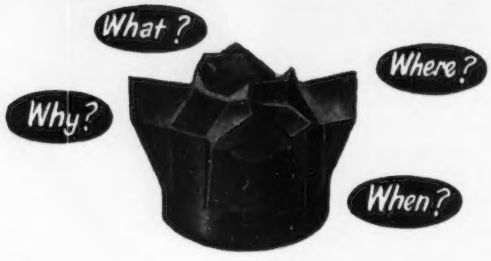
ONTARIO

★**Silver is glistening once more in the Cobalt camp** this year, with greater excitement and enthusiasm in evidence than Cobalters have seen for many a day. The brightest source of excitement in Silver-Miller Mines. In the first four months of 1950 Silver-Miller produced 636,328 ozs. of silver and 16,871 lbs. of cobalt with net value of $444,290, compared with $330,183 in all of 1949. Net profits for the six months ending April 30th were 8.6c per share, and two dividends have already been paid; one of 5c and the other 3c. Working capital at the end of April was in the neighborhood of $135,000.

Other mines sharing in Cobalt's rejuvenation include Consolidated Silver Banner, Cobalt Lode Silver, Mensilvo, Silanco Mining & Refining, and Christopher Silver Mines. The last-named is a new company operating the old Pittsburg Cobalt mine, idle these many years.

★All the silver mines, however, aren't in Cobalt. **The Gowganda camp is also enjoying new prosperity.** Siscoe Metals, operating the former Miller Lake-O'Brien property, produced 338,317 ozs. of silver from 10,992 tons in the first four months

LIDDICOAT



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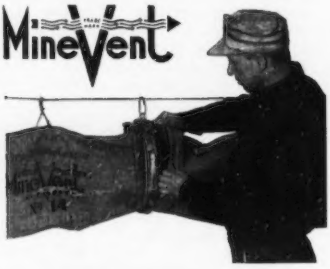

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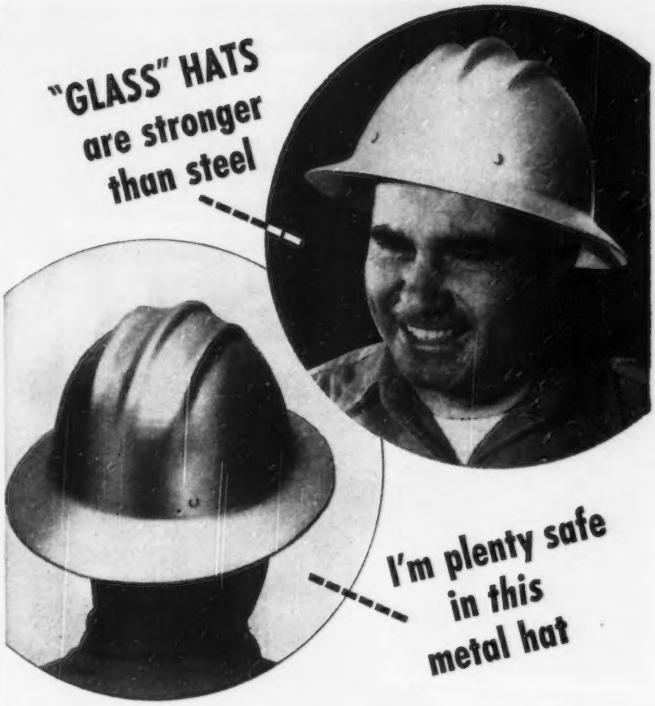
of the year, and should be able to report good profits when the books are balanced for 1950. The company is wholly-owned by Siscoe Gold Mines and is now that company's main mining bet, the original Siscoe mine in Quebec having been closed last year. Thanks to silver, Siscoe has paid 4c in dividends this year, its first since 1945.

Adjoining Siscoe Metals is the Capitol mine of Castle-Trethewey Mines. Closed since 1932, this mine was reopened last year, and a winze was sunk from the 800-ft. level to open three new levels. Preliminary results have been encouraging, if not spectacular. The company, by the way, doesn't have to worry much about mining. It's primarily an investment trust with investments of $6.5 million, built up to that figure by shrewd management during the years in which mining was suspended. More than 82% of Castle-Trethewey's issued capital is held by McIntyre Porcupine Mines.

★**First development results** on the 300-ft. level being opened by Lake-Osu Mines have been good, with values and dimensions better than those of the original drilling. The new company, successor to Osulake Mines, was formed this Spring to revive development at the O'Sullivan Lake property, which has been idle since 1947.

★Bolstered by new finds, and by the price-increase announced last April, **activity in Ontario's uranium camp** along the Montreal River on the east shore of Lake Superior is well above that of 1949. Most advanced prospect is Ranwick Uranium Mines, sponsored by Ventures-controlled Coniaurum Mines. Ranwick is already underground in a tunnel directed toward the downward extension of the high grade pitchblende show found on surface last Fall. Underground work is also being started by Labine-McCarthy Uranium Mines, southeast of Ranwick. Other companies active in the area include Damascus Mines, Roche Long Lac Gold Mines, Hennessy Uranium Exploration, Sootomic Uranium Mines, Canagau Mines, and Arctic Yellowknife Mines.

★**With three years' ore supply still in sight,** Little Long Lac Gold Mines isn't quite ready yet to give up the mining ghost, though it's possible that the end is in sight. It has been known for some time that the mine, original producer of the Long Lac area, would have a limited life unless better conditions were found at depth. So far these haven't materialized, and the management will decide this year whether to continue the search or finish operations on a salvage basis. In the meantime, the company has a strong liquid position with $800,000 in net current assets, not to mention another million dollars of profit available from remaining ore. The ore still in the mine averages 50% higher than the $8.76 mill feed mined last year.



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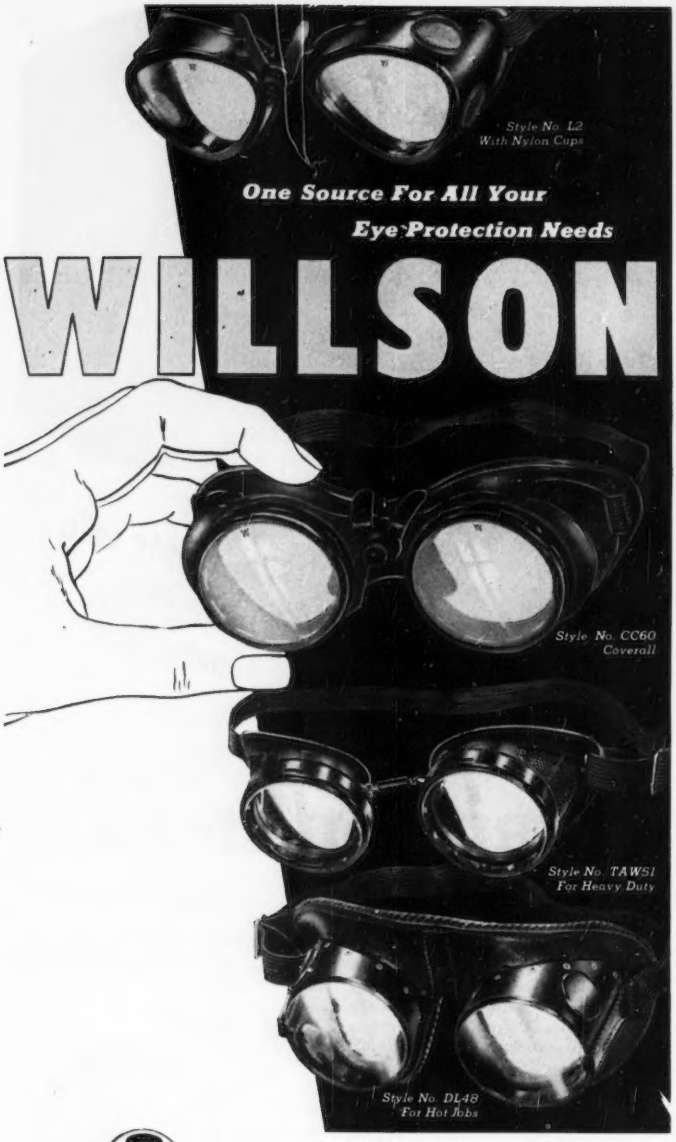

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Ontario (*Continued*)

★**A new lease on life has been taken by Delhi (Temagami) Gold Mines,** inactive for some time on its lead-gold-silver prospect near Temagami in Northern Ontario. A fresh supply of funds has been made available, and a 400-ft. adit will be driven to explore the showings underground.

★With its No. 4 shaft deepened to 7,750 ft., Lake Shore Mines has no opposition in its claim to ownership of the **deepest mine opening on the continent.** Eventually, perhaps within the next twelve months, the shaft will be carried to 8,000 ft., but the managers of the rich Kirkland Lake veteran are in no hurry. They prefer to carry on with deep lateral work at a leisurely pace in the meantime. It will be many years before the new block of ground (2,000 ft. in depth) is fully explored, and by that time the shaft will probably be on its way to even deeper horizons.

★**Ontario's first asbestos mine is now in production,** Canadian Johns-Manville's Matheson mill having reached regular production at 50 tons per hour. Although the presence of asbestos in the area has been known for many years, it was only in 1949 that the new operation was started, and so the management considers the operation still to be in the testing stage. Its success, however, has started a prospecting wave that rolls right along the 75-mile length of the zone of ultra-basic rocks from the Quebec boundary northwest to Cochrane. This infant industry, incidentally, is minute in comparison with the big asbestos operations of Quebec's Eastern Townships. At Thetford Mines, for instance, Johns-Manville mills 18,000 tons per day, in one of the biggest operations of its kind in the world.

QUEBEC

★**East Sullivan Mines will probably net $1.50 per share** ($6 million) this year in its first full twelve months of operation, thanks largely to better prices for lead and zinc. Meanwhile the search for more ore goes on actively, and the job of deepening the shaft from 1,000 to 2,000 ft. is well in hand and should be completed by year-end, so that 1951 will witness a big program of lateral exploration. Attention is also being given to the intriguing gold discoveries made in surface drilling east of the mine this Spring, and a long drive is well out in that direction on the 1,000-ft. horizon.

★**Net profits of Quemont Mining Corporation** may pile up close to $3 per share for 1950 if copper and zinc prices hold in the latter months of the year. The mill is running smoothly at 2,100 tons daily, with metallurgical results shaping up better than

original expectations. Loans have been reduced from $6.9 million to well below $5 million, and shareholders can see the possibility of dividends, perhaps in 1952.

Highly significant, too, are ore developments at depth. Best of these is on the 2,340-ft. level, 200 ft. below the depth to which Quemont's 13-year ore reserve is calculated. An orebody has been disclosed at that horizon carrying 1,600 tons per vertical ft., averaging 0.246 oz. gold, 0.48% copper, and 2.52% zinc per ton.

★**Quebec's newest base metal producer,** Ascot Metals Corporation, is expected to make a creditable showing on its initial production rate of 300 tons daily. Located three miles northeast of Sherbrooke, the mine was first opened about eight years ago, but was acquired by its present owners only last year. Development of the 4th and 5th levels, opened this year, has shown 900 ft. of continuous ore at each horizon.

★**In the Noranda district,** another sleeper has awakened, Old Mill Gold Mines having unwatered its former Granada mine to the 625-ft. level and resumed exploration. A former producer, the property has been idle since pre-war days.

★**Underground drilling is being started by MacDonald Mines,** with the first holes going out from the bottom or 925-ft. level. Early this year MacDonald leased the ground containing its workings and known ore to Noranda Mines, but kept the right to use the workings as a base from which to explore the territory outside the leased area.

The lease runs for 50 years (with a 6-month cancellation clause) and MacDonald will receive substantial royalties. A large tonnage of sulphide-zinc ore has been developed and, while Noranda's production plans are still in the formative stage, it is possible that the initial tonnage rate will be large. Meanwhile the lease gives MacDonald a minimum of $75,000 the first year (already paid), and an additional $100,000 a year starting in 1951.

MANITOBA

★**Ogama-Rockland Gold Mines, Ltd., reports production in April** amounted to $41,555 from 4,181 tons milled for an average recovery of $9.94. This compares with $42,991 from 4,300 tons milled averaging $10.00 per ton in March. Development work on the two lower levels is proceeding rapidly with four machines operating. The No. 4 vein has been opened up for a distance of 225 ft. on the 875 ft. level and 300 ft. on the 1000 ft. level. Short sections of good grade ore were encountered in this drifting but values were spotty. Diamond drilling is continuing on the 750 ft. level to test conditions on the south

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MANITOBA *(Continued)*

shear zone 600 ft. south of the main shaft. One hole intersected good grade of ore but no new vein intersections have been encountered apart from this. New development work is not putting ore in sight as rapidly as it is being milled and ore reserves are being depleted.

★Lepas Flin Flon Mines, Ltd., holding 35 claims adjoining east of the Hudson Bay Mining and Smelting property in the Flin Flon area reports that a **geophysical survey has been completed** and indicated several anomalies. Geological mapping is being carried out at the present time and a program of diamond drilling is contemplated.

NORTHWEST TERRITORIES

★**Lynx Yellowknife Gold Mines, Ltd., has cut values in gold** across 29 ft. at a depth of 248 ft. Twelve feet of this width, which is almost the true width of the vein, averages 0.32 oz. gold per ton and 29 ft. averages 0.20 oz. per ton. Full width of the ore, which occurs in a strong shear zone, still is to be determined.

★**Giant Yellowknife Gold Mines treated 12,754 tons of ore** in May for a recovery of 8,038 oz. gold and 2,638 oz. silver, having a gross value of $311,577. Calculated millheads averaged 0.70 oz. gold and average milling rate for the month was 411.5 tons daily. Advance in No. 3 shaft was 113.5 to 850 ft. below the collar and a station was cut at the 750-ft. level.

★**Excavations to bedrock have been completed at Akaitcho Yellowknife Gold Mines.** A crew is preparing the footings for the shaft and hoist and compressor bases. Headframe materials, compressor, hoist and other gear now are on the property. Objective of a 3-compartment shaft is 1,000 ft. with stations to be cut for seven levels. Five thousand feet of lateral work will be carried out. A 5,000-ft. diamond drilling program is being considered.

★**Giant Yellowknife Gold Mines reports diamond drilling** in the No. 2 shaft area on the fourth level has indicated 100 ft. of additional length still open to the north, to the ore zone previously reported. The company and Conwest Exploration have made a deal under which Giant will buy the six-claim Lolor group, adjoining Giant on the east, with Conwest holding a 12.5% share in a million-share company that may be formed.

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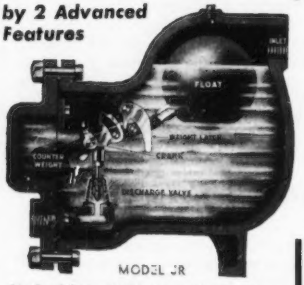

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started on the property of Salmita Consolidated Mines, Ltd., which has announced financing arrangements with the Snare River Trading Co., Ltd., to net $440,000, with initial firm commitment of $50,000. Immediate goal of drilling is to tie up the known north zone with the north zone extension, discovered in late season exploration last year and to build up as large an ore picture as possible before proceeding with shaft sinking which is scheduled for later on in the summer.

YUKON

★United Keno Mines has acquired eight silver-lead-zinc claims near its present operations from Reserve Mining Co., Ltd., one-third of which it owned previously. They have also added five other claims. Development work was to begin this spring. The Reserve company received 50,000 shares of Keno's capital stock as part payment.

★Mineral production in 1949 was $725,290 greater than in 1948. Gold production took first place again.

★Yukon Consolidated Gold Corp. did 2,487,131 cu. yd. stripping and 3,950,987 cu. yd. of thawing.

BRITISH COLUMBIA

★**The British Columbia courts for a second time have rejected an action against Granby Consolidated Mining, Smelting & Power Co.,** at Princeton, for alleged failure to comply with provisions of the province's Industrial Conciliation & Arbitration Act in a dispute over contract holiday provisions with the International Union of Mine, Mill & Smelter Workers. The union, with permission of the B. C. Labor Relations Board, laid charges against the company alleging failure of the latter to arbitrate the holidays dispute. The case was dismissed for lack of evidence; and on appeal was dismissed again for the same reason. Meanwhile, company and union reached agreement (reported May 2, 1950).

★**Gold production in British Columbia** totaled 28,961 fine oz., in March, the highest output for any month in the last three years, according to the provincial government Trade & Industry Department. The March total brought production for the first quarter of the year to 2.69% ahead of the like period in 1949.

★Pioneer Gold Mines of B. C., Ltd., wound up its year ending March 31, 1950, by wiping out a 1949 deficit of $187,458 and reporting developed ore reserves at more than $7,600,000 which promise a new period of profitable operation.

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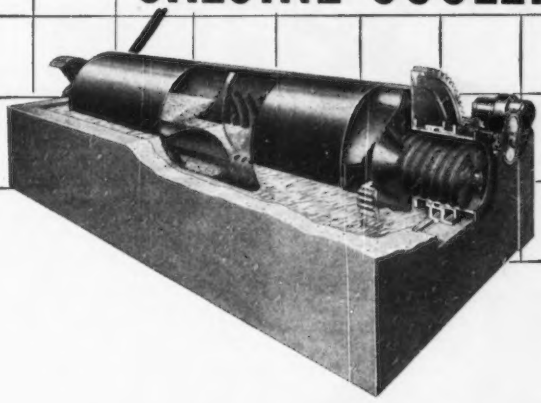

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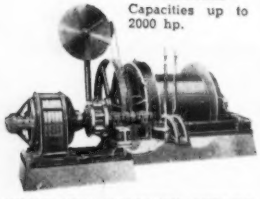

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British Columbia *(Continued)*

Congress Gold Mine, Bridge River. The current campaign by Sheep Creek Gold Mines, Ltd., has opened the vein on No. 4 level in the old section of the mine for 168 ft. For this distance it averages 0.32 oz. gold per ton across 5.2 ft. Latest sample from the face of the drift assayed 0.41 oz. gold per ton across 5.5 ft. H. E. Doelle, Sheep Creek managing director, also reports that the crosscut to the vein on No. 5 level which has for its objective the downward continuation of the vein encountered beyond the fault on No. 3 level, is making good progress.

★**Present high prices for zinc** has been benefiting Sheep Creek Gold at two base metal operations. Zincton mine, wholly-owned, is at full capacity of 350 tons daily, with output estimated at approximately one million pounds monthly. Paradise mine, Windermere Valley, also wholly-owned, is on a commercial basis treating 50 to 60 tons daily of ore running 12 to 15% combined lead and zinc, plus 4 to 5 oz. of silver. Vananda mine, Texada Island, in which Sheep Creek has a one-third interest, is shipping 2,000 tons monthly of crude copper-gold ore to the Tacoma smelter.

★**Golden Ledge Syndicate, Ltd., will explore** three quartz veins occurring in greenstone for possible gold content this season at its property two miles north of Bralorne Mine in the Bridge River camp. On the advice of Dr. Victor Dolmage, consulting geologist, exploration will seek extension of known veins within a belt of greenstone crossing the property. The belt of greenstone penetrated last season proved to be 108 ft. wide.

★**Torbit Silver Mines, Alice Arm, reports an operating profit** of $130,000, after taxes, for the first three months of 1950, and output now is at its initial goal of 375 tons a day, compared with a treatment rate of 330 tons daily in early May. During the quarter ended March 31, the mill treated 29,820 tons of ore and produced 496,518 oz. silver and 204,424 lb. of lead. Ore reserves have been increased since the first of the year by approximately 100,000 tons and now total 800,000 tons averaging 20.3 oz. silver per ton after allowance for dilution. Preparations are being made for sinking a three-compartment shaft to a depth of 300 ft. below the bottom level, now at the 1,000 ft. horizon. Two levels are to be opened at 100-ft. intervals, and a loading pocket and sump will be cut. Sinking is expected to make available 417,000 tons of ore indicated by drilling. Because of a water shortage due to a dry spring, height of the storage dam is being increased to provide ample storage next winter. Based on current silver prices, Torbit expects to reduce its $2,500,000 loan from Mining Corp. by approximately $500,000 this year.

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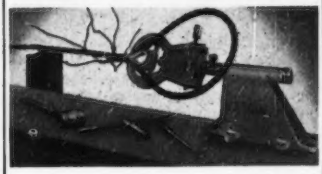

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★**Retallack** Mines, Kootenay Belle subsidiary at Whitewater in the Kootenay, is **swinging its new sink-float plant into operation** with hopes of doubling the previous production rate of 320 tons daily. The plant was installed earlier this year to achieve the lowest possible per-ton costs to permit a profit on 2% zinc feed, lowest commercial grade in North America, from the zinc lead dumps. There is sufficient material on hand to run the mill a year, and then other dumps in the area will be available. About 20 tons a day are being taken from the mine and underground work will be expanded as rapidly as possible. Retallack reports a profit of $39,128 before depreciation and writeoffs for the year ended February 28, 1950. During the period the mill treated 69,928 tons of ore compared with 36,207 the previous year. The company realized $177,420 on ore milled from its own property and $56,125 from customs ore, compared to $166,010 and $38,472 the previous year. Reduction in prices of lead and zinc accounted for the comparatively low amount realized on the company's ore.

★**Anticipating start of underground work in August at the Silver Giant mine** near Spillimachene, Giant Mascot Mines, Ltd., is shipping materials for a new 200-ton mill at the property and is installing a 500-hp diesel power plant. Giant Mascot was formed recently under an agreement whereby Hedley Mascot Gold Mines, Ltd., holds 55% of the stock and Silver Giant Mines, Ltd., 45%.

August is New - Equipment - Month. 294 items (Count 'em), featured at the Salt Lake Mining Show, discussed and classified in this issue. See page 127.

★Hedley Mascot Gold Mines, Ltd., in its annual report indicates **a switch from gold to lead and copper** in its operations in the immediate future. In April, 1949, the company shut down its gold operations at Hedley, moved its mining equipment to the mill site and proceeded with investigations of other properties where its mill could be utilized. Besides the decision to develop the Silver Giant mine, Hedley Mascot secured an option on the Sunloch and Gabbro properties near Jordon River on southern Vancouver Island. Diamond drilling resulting in blocking out of approximately 470,000 tons of ore averaging 3.70% copper, but engineers decided twice that amount should be in sight before a decision was reached on the size of mill required. The company renewed its Bradshaw option on Nickel Plate Mountain at Hedley for a period of five years. The option covers the Florence Fraction, Little Pittsburgh, Whale Fraction, Bullion Beak and Eagles Nest No. 2 claims. Because the 11,000 tons of ore blocked out could not be mined profitably, the

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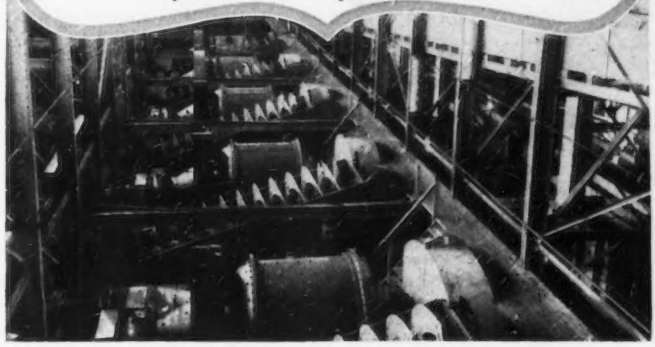

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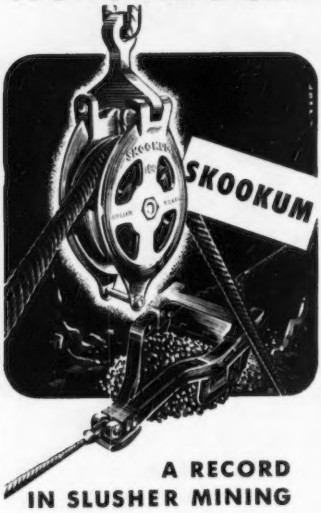

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British Columbia *(Continued)*

company dropped its option on the Copper Chief and Nick of Time claims. Decision to close down operations after cleaning up of ore on the Mascot Fraction was taken after a search failed to find new ore bodies around the Bradshaw fault on the 3,700-ft. level. In addition to the Bradshaw, Good Hope and Nighthawk claims are retained in good standing. In the last 3½ months of milling at Hedley, the company realized an operating profit of $36,000. During the 13 years ended April, 1949, the Mascot Fraction claim yielded $8,500,000 gold.

★**New high production record of $125,000 gross,** is reported by Silver Standard Mines, New Hazleton, for May. This compared with $110,000 for April and $117,000 for March. May output averaged $76.15 per ton, with 1,831 tons milled, ore averaging .102 oz. gold, 39.6 oz. silver, 3.23% lead, 8.3% zinc and .108% cadmium. A new bunkhouse, warehouse, first aid room and office additions are being built.

★**Increase in ore reserves and improvement in grade are cited in Silver Standard Mines annual report.** Indicated ore reserve now exceeds four years' requirements for the present mill. New ore discoveries, particularly the No. 6 vein, have more than doubled the per-ton metal content. At June 1, reserves had a calculated gross value of slightly less than $8,000,000. For the year ended March 31, 1950, an operating profit of $249,102 was earned on an average millhead of $42.67. The mine now has 88,000 tons indicated, averaging approximately $80.50 per ton gross. Net profit after writeoffs was $147,118 or $7.26 per ton. Ore milled totaled 20,268 tons in 340 days' operation, for an average of 59.6 tons daily. Output included 1,526,679 oz. gold, 507,367 oz. silver, 881,294 lb. of lead, 2,259,054 lb. of zinc and 25,031.20 lb. of cadmium. Total value of output was $864,856.63. Total of 2,524.5 ft. of development work was done during the year, and diamond drilling totaled 1,337 ft. The 1950 program consists of shaft sinking (now down 75 ft.) on No. 1 vein, and subsequent drifting; extension of present drifts on No. 4, 6, 7 and 8 veins; possible crosscutting to No. 9 vein; and sinking of a main three-compartment shaft in the vicinity of No. 6, 7 and 8 veins, to give 500 ft. additional depth. A double drum hoist of 1,500 ft. depth capacity has been purchased for this purpose. A unit cell is being added to the circuit to recover a high grade lead concentrate at the ball mill discharge, and improvements are being made to the sorting plant, which are expected to increase the total recovery of metals.

★**Kootenay Exploration of Nelson has begun work at its Kinbaset Lake property,** 70 mi. north of Golden. Camp equipment has been set up for an intensive surface program and diamond drill and compressor will be

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moved in later. Ten of the 500 acres comprising the property have been explored, W. S. Hamilton, mining engineer at Nelson, reported to directors.

★**Budwiser Lead & Zinc Co., Ltd., a newly-formed company, plans active exploration on the Budwiser-Amazon mineral** claims at the mouth of Woodbury Creek.

★**Guishon Mine, Ltd., reports intersections of three new veins** at its Copperado mine, Nicola Valley, on the 200 ft. level have materially increased tonnage possibilities. Two of the veins were cut by the shaft as it was carried down on the main shear zone. Development is being extended north and south from the shaft and crosscuts are being driven to the new veins at 175-ft. intervals. Sampling of the new low level by Alfred R. Allen, consulting engineer, indicates values from 4.64% to 7.95% copper, with native copper in both walls of the veins and chalcocite coating the bornite.

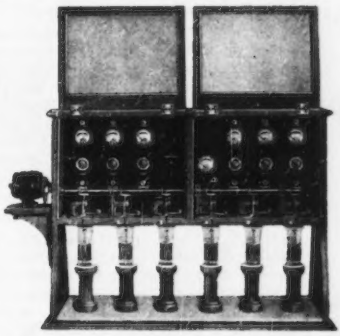
★**Carnegie Mines, Ltd., is proceeding with plans to reopen the Silversmith** silver-lead-zinc mine in the Slocan mining division.

★**Upper tunnel at the Wellington mine,** near Retallack, has been opened up, Waddington Mining Corp., Ltd., reports, and over-all reconditioning work is progressing well. Assays of samples taken from diversified sections of the property disclose some remarkable values, especially in zinc ore.

★**Drift placer mining by Noland Mines, Ltd.,** which is pioneering this type of operation at Spruce Creek, Atlin, northern British Columbia, moved into the profit column in April, with substantial improvement in May, according to company officials.

★**Kenville Gold Mines mill, six miles west of Nelson, has been reopened** after a shutdown of one year. Lessee of the mill is F. C. Buckland. Kenville ore, and ore from outside shippers and from mines controlled by Mr. Buckland will be treated. Prior to closure in 1949 the mill had run for a year treating ores on a custom basis. Mr. Buckland plans to ship ore from the Larington mine, Salmo, and from the Eureka Mine, adjoining the Kenville property, where a raise is being driven into the Eureka ore. Kenville Gold Mines, Ltd., recently accepted Mr. Buckland's offer to lease the crown-granted claims and plant from June 1 to Dec. 31, subject to earlier termination by the lessee on one month's notice. His offer was conditional upon an option to purchase 2,317,567 shares of Kenville Gold held by Noranda Mines, Ltd., and Quebec Gold Mining Corp. Noranda and Quebec Gold financed Kenville Gold into production.

★**A $40,000 development program has been recommended** for this season at Western Uranium Cobalt Mines, Ltd., properties, New Hazelton area,



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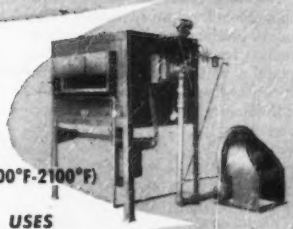

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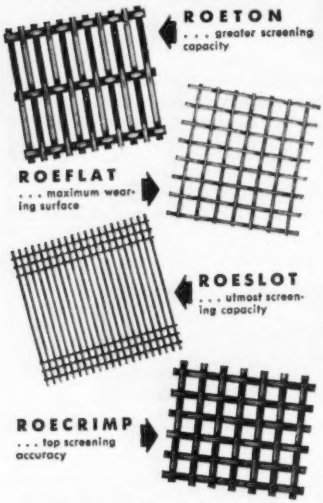

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A CENTURY OF CONFIDENCE

British Columbia *(Continued)*

by M. W. Jasper, mining engineer, based on showings disclosed recently in old and new workings. Organized one year ago, the company reports initial encouragement in investigation of uranium and cobalt deposits to purchase the adjoining Rocher de Boule mine and has optioned four crown-granted lots in the Cassiar district, the Victoria, Belle, View Fraction and Belle Fraction mineral claims.

★**Hamil Silver-Lead Mines, Ltd., is raising $30,000** from sale of stock to develop its property in the Ainsworth mining division. The firm has acquired the Regina, Flora, St. Patrick, Maria and Red Deer claims, and the Hamil Fractions Nos. 1, 2 and 3, and A. St. Clair Brindle, consulting engineer for HSL, has laid out a new truck road and taken mill samples from the Regina mineral claims. Three and a half miles of road will be built, starting six miles from Argenta and reaching from the 1500 ft. level to the 3750 ft. level to permit installation of machinery at the mine. Initial work will also include construction and repair of buildings, surface exploration and sinking of a winze as well as drifting and cross-cutting underground.

★**Silver Ridge Mining Co., Sandon district, has resumed operations** discontinued last December because of severe winter conditions. Development is beginning at the Corintti in the Wild Goose Basin, and work will be resumed at the Wonderful following this. Operations at the Wonderful will consist of driving on the Wonderful vein, encountered below the old Cunningham workings where half a million dollars worth of ore was mined prior to 1930. It is expected shipments from the Corintti will begin soon. There is a large tonnage of high grade ore in sight.

★**Consolidated Mining & Smelting Co. of Canada will spend approximately $500,000** in its ore development and extraction plant at the Sullivan mine at Kimberley. The present project covers installation of two conveyors and excavation of tunnels to accommodate them. The conveyors will raise ore from the 2850 ft. level to the 3350 ft. level. The conveyors will have 36-in. belts and will be powered by 200 hp. motors. The new sections will connect with the six-section conveyor system, installed in 1944, and thus will permit raising of ore from the 2850 level to the 3800 level, from where it can be loaded into cars and hauled out of the mine on the recently-completed direct low-level haulageway to the concentrators. Total length of the original and two new conveyors will be more than 4500 ft. and the system will handle 400 tons of ore an hour. Sullivan annually produces approximately 2 million tons of lead-zinc-silver ore.

★**The Blaylock Rose Bowl was won by the Sullivan mine** first aid team in

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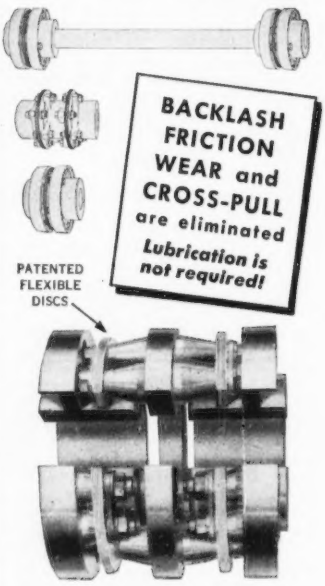

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competition with teams representing Trail and Calgary operations of Cominco. Personnel of the winning team: T. E. Plant (Capt.), J. McConachie, J. E. Jacobson, V. E. Lindenberger and D. C. Brown. Martin Beduz was coach. Presentations were made by Adam Bell of the British Columbia Workmen's Compensation Board, Vancouver.

★**Grayrock Mining Co. has been formed** to take over assets of Bellore Mines, Ltd., including claims in the Bridge River district. Work done on the 16 Bellore claims during the last few years has disclosed interesting occurrences of high grade antimony and also some high grade gold-silver-lead-zinc ore. Crosscutting and drifting are planned, under direction of Len Belliveau, Bridge River prospector. Belliveau, with the late Andy Bergenheim, was one of the original prospectors in the Truax Creek area and was the vendor of the original Grayrock group turned over to the Bellore company.

★**Zenda Gold Mining Co. of Las Vegas, Nevada, has acquired the Taylor Creek Mining Co.'s placer properties** in the Cariboo district from Twentieth Exploration, Ltd., and will start dredging operations under the name of Zenda Gold Mining (Canada), Ltd. Properties include four groups of claims, three of them near Quesnel and one 300 miles north. Zenda has also acquired modern dredging equipment and preparations have been made for drag-line dredging operations on some of the properties this summer, while exploration work will be carried out in other areas preparatory to operations on a large scale next year. Properties include: Abbau and Lodi Lake, 12.5 sq. mi., 40 mi. northeast of Quesnel, where development last year showed values at depth ranging from 46.5c. to $1.46 per yd.; Sovereign Creek, 27 mi. east of Quesnel, with indicated 700,000 yd. of gravel averaging 37c. per yd.; Longbar, six claims covering 4 mi. of the east shore of the Fraser River, 8 mi. north of Quesnel, with values of more than 50c. per yd. down to 3 ft. depth; Darkwater, 4 mi. of leases 300 mi. north of Quesnel on the west bank of the Parsnip River. It is planned to put a small shovel to work up enough yardage to make worthwhile the installation of a fairly large bucketline dredge sometime in the next year.

★A $160,000 section of the Trail-Tadanac Hospital, constructed by Consolidated Mining & Smelting Co., has been given to the hospital board. The transfer gives the hospital board title to the entire building and makes possible plans for future development to provide much needed accommodation. The section was constructed in 1926 and currently houses the hospital administration offices, maternity and other special facilities. About 40% of the hospital beds are in the section.

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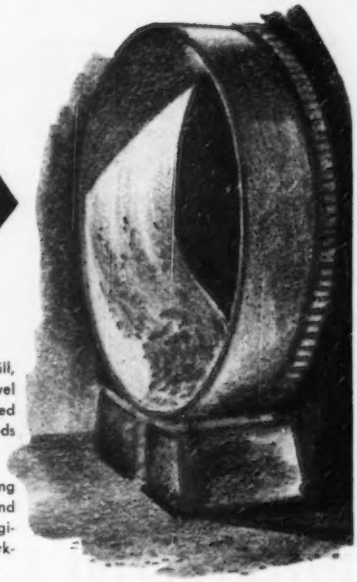

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IN LATIN AMERICA

• Argentina Reports New Iron Ore Find
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MEXICO

★**Freight rate increases** have replaced labor troubles as the chief thorn in the side of Mexican mining. So grave does labor view the situation, that miners union executives, headed by Jesus Carrasco, new secretary-general, called on President Miguel Aleman and assured him that unless the new tariffs are modified, only the big operators will be able to stay in business.

Government-administered National Railways, the country's largest railroad, countered with a statement that mining is the only one of its cargo customers to complain. They declared flatly that it is impossible to pare the new rates because of the cost ($838,500—a credit from Eximbank) of 200 new ore gondolas recently bought in the U. S. to improve service for mining.

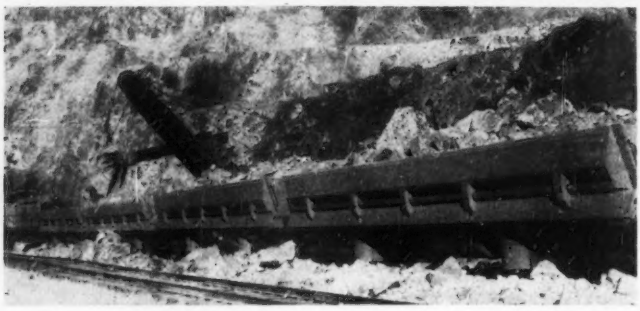
Larger operators are not objecting because additional cars will help prevent large scale stockpiling, heretofore a major problem.

★**Labor peace is in prospect,** at least temporarily, with the Labor Ministry having outlawed the recent strike at AS&R's subsidiaries. The Ministry explained its action by stating that strikes are illegal unless a majority of workers vote for them. Settlement came on the eve of the shutdown of Mexico's 2 greatest steel works.

Strikers got two weeks of rest at their own expense, and the union will have to pay costs of the strike. Company and union officials are now discussing proposals to hike pay and grant other economic benefits that will cost about $1,490,000 annually.

★President Aleman has decreed a **ban on removal of ore from the supposed uranium deposit at Jalapa del Marques** on the Isthmus of Tehuantepec, until the National Institute of Investigation of Mineral Resources decides whether or not assays actually show uranium.

The deposit is franchised by Minerales Mecicanos del Sur, S. A., subsidiary of Tennessee Product and Chemical, Nashville.



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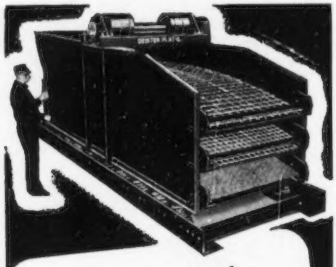

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★**A 20% lead strike** with good gold and silver at La Mina, Motolina municipality, Chipas, was reported to the Government by Col. Gustavo Lopez Gutierrez.

★**The National Supreme Court** upheld the recent Labor Law amendment that employers of miners proven to have died of silicosis while in service, must indemnify the deceased's kin. The ruling came in the case of Cananea Consolidated Copper, who must indemnify the widow of a silicosis victim.

★Despite its plea that it lacks profitable amounts of gold and silver, Cia. Mineral de la Natividad y Anexas, S. A., Oaxaca, had to make peace with 450 organized workers by **granting a 10% wage increase.** San Francisco Mines, Chihuahua, averted a strike by allowing a 14% increase instead of 30% sought by workers.

★**Three American companies won top prizes** in the 1949 safety contest of the Mexican Hygiene and Safety Association. First award went to AS&R's Chihuahua City plant; second to AS&R's subsidiary, Cia. de Combustible Agujita, S. A., Nueva Rosita, Coahuila; and third to Fresnillo's plant at Zacatecas.

Correction

Referring to the statement in our July issue, p. 120, that the Toquepala deposit in Peru is considered a possible equal of Chuquicamata, we are informed that there are no indications that the two deposits are comparable, either as to size or grade.

ARGENTINA

★A new iron deposit has been found in Patagonia, in the Rio Megro Territory, near Puerto Lobos. The deposit is of sedimentary origin and belongs to a big ferriferous basin of which only a small part has been explored. Outcrops run over 4 miles and the ore is mostly hematite, best samples running up to 57% iron.

The discovery was made by private prospectors with the technical and financial cooperation of the Banco de Credito Industrial. Development work has been undertaken by the Direccion de Industria Minera which is carrying out an intensive plan of drilling and trenching.

Only production of pig iron in this country comes from Altos Hornos de Zapla, near Jujuy in the northern part of Argentina. This operation, run by the National Government through Fabricas Militares, is heavily handicapped by poor quality ore, high cost of fuel (charcoal), and railway transportation of pig iron to the steel plants located down in Buenos Aires.

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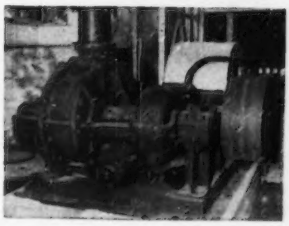

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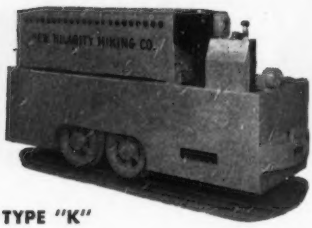

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HEADQUARTERS FOR BUSINESS INFORMATION

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F-22

Argentina *(Continued)*

ore has been put under government control. According to a recent decree, the National Government will fix production quotas for all beryllium mines in the country. Export by private entities is prohibited and internal price will be fixed by the Ministerio de Economia.

★The National (Federal) Government has initiated the application of article 40 of the new Constitution by which all mines in the country became the property of the Nation. Province of Jujuy (one of the 14 Argentine States) has been the first to give over the mining control to the National Government. The former Direccion Provincial de Minas is now a delegation of the Direccion Nacional de Industria Minera from Buenos Aires.

CHILE

★The blast furnace of Cia. Acero del Pacifico near Talcahuano started producing pig iron on June 4. This was the first pig iron produced in Chile in a blast furnace employing coke as fuel.

Cia. Acero del Pacifico is a $90-million steel mill, designed to produce 200,000 metric tons of steel per year, supplying practically all the steel needs of Chile. It has been built under the technical direction of Kopper, Ltd., financed by the Eximbank with $45 million. Bethlehem Chile Iron Mines will supply high-grade iron ore. Coal will come from nearby mines of Lota and Schwager plus some American coal.

★Minister for Economics, Senor Ruiz, has announced his decision to send a bill to Congress allowing the Chilean Mining Bank to subscribe an 80-million pesos loan to permit the Bank to buy and pay promptly for all ores and metallic gold offered by the miners. For the last two years the Mining Bank has been short of cash and ore sellers have had to wait considerable time for their payments.

★The Government, mining interests and the press have been giving considerable attention to the possibility that the U. S. Congress, by taking no action, will automatically again impose a 2c. tax on foreign copper. The law allowing foreign copper to come into the States free expired June 30. Since the Chilean Government obtains a considerable revenue from copper taxes, and the country the greatest proportion of its dollar income from the copper industry, the 2c. tax on foreign copper is viewed with the greatest concern.

★Andes Copper Mining Co. is increasing the capacity of its flotation mill to 22,000 tons a day by installing two 9x9-ft. Marcy ball mills. Flotation in the new sections will be done in shallow Britannia cells. Thus

equipped, Andes will be able to produce about 9,000,000 lb. of copper per month.

★Construction of an 80-ton flotation mill for Cia. Minera Delirio de Punitaqui is progressing favorably. The mill will be ready for operation next October. When the sulphides are exhausted from this copper-gold ore, the mill will be transformed into a cyanide plant to handle ore from the oxidized zone where the copper has been leached leaving a free gold-milling ore.

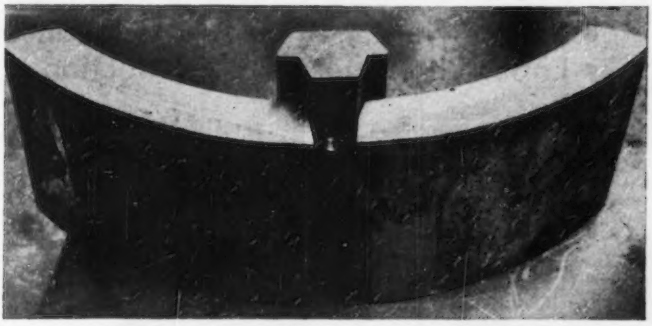
★The Ministers for Economics and Public Works, Messrs. Ruiz and Merino Segura, flew recently to Copiapo to visit the Paipote Smelter under construction. After inspecting the smelter both ministers attended a meeting which had been organized by the Copiapo Mining Association. The president of the Association asked the ministers to consider four measures which were of interest to the miners of Atacama Province. First, that a greater variety of articles be allowed to be imported with the so-called "gold dollars"; second, that the electrolytic refinery be built at Paipote; third, that a 1½% tax on the value of all ores, concentrates and metals sold supersede all present taxes on the mining industry, and fourth, that the proposed augmented tax on gasoline be dropped as this will increase still further the already high cost of truckage.

Not going to Salt Lake is no excuse for not profiting by the AMC Equipment Show. See page 127.

★Corporacion de Fomento (Chilean RFC) has given a loan of one million pesos to Cia. Minera Cerro Negro, a copper company operating a mine and a 400-ton-a-day mill near Cabildo in Aconcagua Province.

A month's strike by Foley Brothers construction workers erecting the new sulphide plant of Chile Exploration Co. was finally settled by the Secretary for Labor, Puga Fisher. The men obtained increases in wages and other benefits. This strike was causing serious anxiety in the country because the operating crews of Chile Exploration Co. also walked out in a sympathy strike, together with all Chilean employees and later all men at the nitrate plants of Maria Elena and Pedro de Valdivia, at the railroad from Tocopilla to Toco, miners and mill men at the Chilean Copper mine of Despreciada and longshoremen at the port of Tocopilla. Altogether 15,400 men were striking, bringing to a stop copper and nitrate production in the Antofagasta Province which accounts for more than half of Chile's copper production and about 75% of its nitrate output. Though outlawed, Communists were thought to have played an important role in engineering the so-called "sympathy" strikes.

Lifting Bars wedge between Lorain Liner Plates and clamp them down. Symmetrical Lorain Liner Plates can be reversed and interchanged to compensate for severe wear.



LORAIN ROLLED PLATE LININGS

cut grinding costs because —

This photo illustrates how thin a Lorain Liner Plate will wear without failing. Cut grinding costs in your mill by installing durable Lorain Liner Pates.

they go in faster . . .
they stay in longer . . .
they increase mill output

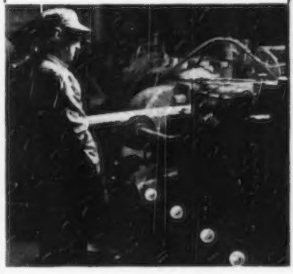
BECAUSE U·S·S Lorain Rolled Plate Linings are made to accurate size and in easy-to-handle sections, they save hours of installation time and greatly reduce mill down-time. And because of the toughness of the rolled steel from which they're made, linings can be kept in service until extremely thin—thereby increasing the usable diameter of the mill and boosting output.

In some applications, as lift bars wear down in service, Lorain Rolled Plate Liners may be restored to full grinding efficiency—at only partial lining cost—by renewing the lift bars. Since the liner plates are symmetrical and interchangeable, they may be reversed to opposite ends of mill to balance wear when pronounced variance in wear occurs at feed and discharge ends. Such flexibility and ease in restoring lining efficiency mean reduced grinding costs.

U·S·S Lorain Rolled Plate Linings are available through leading mill manufacturers whose names will be furnished upon request.

To make better, more economical grinding doubly sure use U·S·S GRINDING BALLS

U·S·S Grinding Balls are especially made for the industry to the most exacting specifications of hardness and toughness. Standard sizes available from ¾" to 5".



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TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

LORAIN ROLLED PLATE LININGS AND U·S·S GRINDING BALLS

USS

UNITED STATES STEEL

IN AUSTRALIA

• Broken Hill Smelters Airs Grievance
• Labor Shortages Slow Production

VICTORIA

★Gold Mines of Australia, Ltd., is making a **survey of the gold resources of Whipstick Forest,** near Bendigo. Aerial mapping of an area of 12 square miles has been completed.

★**North Deborah produced 4,279.5 oz. of gold in six months** ended May 31. This was 114.5 oz. less than in the preceding six months. Profit was about 50% higher, reflecting the 44% increase in the gold price due to devaluation.

★**Deborah Gold Mines has sold its mine with plant,** battery, buildings, equipment and leases to North Deborah for £10,000.

TASMANIA

★**Mt. Lyell Mining & Railway Co. is offering stockholders** 775,000 £1 shares of new common stock at par. The issue is to provide capital to cover in part expenditure on additional plant and equipment at the mines and works in Tasmania to increase copper production from known ore reserves; on new and more efficient rolling stock for the company's railway to boost its carrying capacity; and on Mt. Lyell's investments in Metal Manufacturers, Ltd.

★**King Island Scheelite milled 69,707** tons in six months to April 22, contrasting with 73,925 tons in the corresponding period of 1948-49. The decrease was due to shortage of water for milling purposes. Production of concentrates dropped from 362 to 340 tons.

★A report by Aberfoyle Tin discloses that **an ore vein 84-94 in. wide has been cut** at the No. 8 level. It carries very good wolfram values with some tin. It is hoped that other veins will be picked up by cross-cutting. These veins were located in horizontal diamond drill bores some time ago. In 41½ weeks to April 15 the company produced 340.35 tons of tin concentrates, 82 tons of wolfram concentrates and 8.21 tons of residues. These figures indicate increases over the corresponding period of 1948-49, except for residues.

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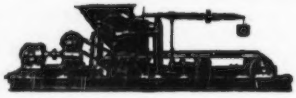

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NEW SOUTH WALES

★Up to 1949, the intake of unskilled recruits going into training as miners was just sufficient to maintain Zinc Corporation's and New Broken Hill's production program. However, **the shortage of labor has now become acute,** threatening to slow down the companies' ten-year-plan.

Broken Hill mining unions have agreed to proposals to allow more labor on the field, but on conditions not likely to be acceptable to the mine managements. The union executive has recommended that eight years' residence within 300 miles of Broken Hill should be sufficient qualification, at the same time insisting on a lowering of medical standards and on the principle of "last on first off" in case of dismissals.

The report discloses that New Broken Hill's production target for 1949—173,000 tons of ore—was exceeded by 2,232 tons. During the year the haulage shaft was sunk 254 ft. to a depth of 3,249 ft. Following completion of the concrete head frame and the installation of a 900 h.p. electric winder, the shaft was in commission by the end of December. Full-size excavation of the service shaft reached a depth of 1,497 ft. early in April this year. Together with full-size excavation from the surface, pilot winzing was started from No. 8 level and completed to the No. 22 level. Stripping of the pilot winze to full shaft size commenced late last year.

★**New Occidental Gold Mines N. L. treated 92,399** tons of ore from the New Occidental mine for 30,439 oz. of gold and 51,829 tons from the Chesney mine for 3,017 oz. of gold and 796 tons of copper in the company's financial year ended June 4. New Occidental's favorable returns have helped to increase New South Wales gold production for the first quarter of 1950 by nearly 10% over the corresponding period of 1949.

QUEENSLAND

★The Cloncurry district will be the first area to be investigated in a five-year federal and state survey of North Queensland mineral resources. Principal minerals sought are copper, tin, manganese, antimony and chromium.

★Directors of Mount Isa Mines, an American Smelting & Refining subsidiary, announced that no interim dividend will be paid in the current year. Income had fallen off due to the drop in lead and zinc prices and demand on cash resources had been heavy due to the need to provide houses for workers. Other items affecting income were payment of the so-called lead bonus to workers engaged in constructing the new copper plant, purchases of stores at higher prices and suspension of zinc concentrate shipments during a period of unprecedented rainfall.

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Locomotives

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Brookville can offer greater value and performance per dollar because Brookville uses high grade power plants produced economically in quantity by the leading manufacturers of heavy duty tractor engines, namely: International Harvester, Caterpillar and Ford.

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Fuel costs are kept down by efficient Diesel power plants; and cost per ton is held to a minimum by high speed operation through four and five speeds in both forward and reverse.

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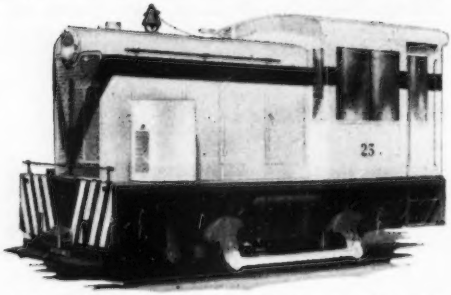

This new, 25-Ton, 0-4-0 Davenport brought to a total of seven the Davenport Locomotives serving the Granite City Steel Co., Granite City, Illinois.

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WESTERN AUSTRALIA

★**Great Western's first call on stockholders,** involving £150,000, helped mining calls in May reach the largest monthly total on record—£180,000. Great Western Consolidated was floated last February with a nominal capital of £2½-million to develop leases near Southern Cross.

★**An option has been taken up by Broken Hill Pty. Co., Ltd.,** the iron and steel combine, over a group of nine leases at the north end of the Golden Mile. The company intends to spend £25,000 on diamond drilling and other exploratory work. The leases adjoin Hannan's North mine, which B.H.P. has been working since the early thirties. As Hannan's North is a fully owned subsidiary of B.H.P., little information on this mine has been made available. It has produced 451,000 tons of ore for an average yield of 7½ dwt. gold.

★**Nevoria Gold Mines is reported to have pegged 25 leases** in addition to those already held at Nevoria, in the Yilgarn field. Nevoria succeeds a company of similar name now in liquidation. The new company is being floated in Johannesburg with a capital of £500,000 stg. to take over the assets of the old company.

★Sons of Gwalia, Ltd., has resumed dividend payments after its 1948 loss of £16,245 stg. Profit for 1949 was £27,909 stg.

NORTHERN TERRITORY

★Australian Development, Tennant Creek, **reported a return of 2,969 oz. from 764 tons of ore** in the four weeks ended June 13. This represents a grade of nearly 4 oz. per ton. The mine, known as Noble's Nob, is one of the most promising in Australia.

SOUTH AUSTRALIA

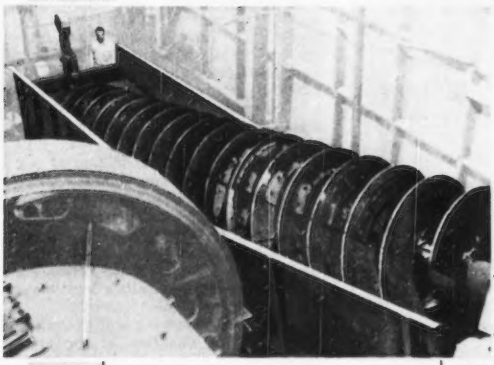
★Broken Hill Associated Smelters, Australia's only producer of pig lead, has taken its case for a restriction of domestic lead supplies before the public in an unusual advertisement in which it criticizes the immunity of Mount Isa and Lake George from the penalties of a controlled domestic lead price.

B.H.A.S. treats the lead concentrate output of the four Barrier mines together with the residue from the Electrolytic Zinc treatment plant at Risdon, Tasmania. The output of other producers is exported either as lead concentrate or lead bullion, realizing the world parity price for the metal or metal equivalent. The advertisement points out that B.H.A.S. can only get the benefit of the world price for refined pig lead — currently equivalent to £A110 per ton—after the domestic demand has been satis-

Actual Operating Results Prove Efficiency of **WEMCO S-H CLASSIFIER**

Sharp separation at large capacity is a proven result at the Fredericktown Mill of National Lead Company, St. Louis Smelting and Refining Division. In handling a lead-copper sulfide ore, a WEMCO S-H Classifier is more than meeting requirements for close separation (desired grind—60% minus 200 mesh).

SHARP SEPARATION—From the table below note that this WEMCO S-H Classifier overflow analyzed 64.0% minus 200 mesh, showing a recovery of 88.1% of the minus 200 mesh material contained in the feed. Despite the high percentage of plus 65 mesh fraction in the classifier feed, only 4.5% was retained in the overflow. The sands, analyzing only 5.4% minus 200 mesh, contained 95.5% of the plus 65 mesh feed.



LARGE CAPACITY—Rate of overflow in this installation is 825 tons per 24 hours, exceptional capacity for a unit of this size (72" x 32' 0", Series 125, Straight Tank, Triple Pitch).

SCREEN ANALYSIS

WEMCO S-H Classifier at Fredericktown Mill, National Lead Company, St. Louis Smelting and Refining Division.

MESH	INDIVIDUAL PERCENTAGES RETAINED ON FEED	SAND (61.4% OF FEED)	OVERFLOW (38.6% OF FEED)	CUMULATIVE DISTRIBUTION OF FEED SIZES SAND	OVERFLOW
+65	51.2%	79.8%	6.0%	95.5%	4.5%
100	9.8%	8.9%	11.2%	89.2%	10.8%
150	5.8%	3.9%	8.9%	85.0%	15.0%
200	5.0%	2.0%	9.9%	80.7%	19.3%
-200	28.2%	5.4%	64.0%	11.9%	88.1%

THE S-H DESIGN

- **Greater capacity** of WEMCO S-H Classifiers is proven in operation—and explained by design. The S-H design permits use of a triple spiral for greater raking capacity with decreased pool agitation. In turn the greater capacity for sand removal creates a larger effective settling area. Both sand and overflow capacity equal that of the next larger size machine of other makes.
- **Modern design** of the WEMCO S-H Classifier gives superior operating results. The main shaft has a diameter up to 40% greater than other spiral classifiers. Flight arms are shorter and stronger, bearings are antifriction and fully protected, and modern hydraulic lifting action is provided for the spiral. Because the design is right, WEMCO S-H Classifiers do more work yet cost you less to run.

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The new Acker Teredo is light, so compact, so simple that it can be mounted easily on truck or jeep and driven by separate motor or power take-off. Small as it is, the Teredo is a high capacity, fast-operating unit capable of extracting cores up to 2 3/16" in diameter and of drilling to depths of 600 feet.

Send for bulletin 3-B-EM.

ACKER DRILL COMPANY INC.
Scranton 3, Penn.

South Australia *(Continued)*

fied at the controlled selling price of £A35 per ton. The burden of subsidizing the Australian consumer therefore falls solely on B.H.A.S. and affiliated mines.

The difference between the local and international prices has led to an abnormal increase in Australian consumption because scrap lead, which in the U. S. and U. K. accounts for over 40% of consumption, has been cornered by speculators against the day when the embargo on scrap exports or controls on the domestic lead price are lifted, the advertisement alleges.

"This being the case," the advertisement concludes, "the Broken Hill mining companies, together with the Electrolytic Zinc Company of Australasia—who are at present the only lead producers who provide lead for local consumption at the fixed price —have now given notification to B.H.A.S. that they are no longer prepared to supply B.H.A.S. with lead concentrate for the production of pig lead for resale at the domestic price beyond the proportion which each producer of lead concentrate would be called upon to bear were all producers of lead bearing materials in Australia contributing proportionately towards the meeting of Australia's legitimate requirements of lead."

If the advertisement was meant to be a plea for abolition of the price disparity between lead for domestic consumption and lead sold overseas, or for a government move to make outsiders like Mount Isa and Lake George share the burden—it has so far produced no result. However, the threat of a lead famine has caused the price control authorities to issue an order compelling holders of scrap lead to report their stocks. Compulsory recirculation of these stocks into industry may be the next move.

In an appendix to the advertisement, B.H.A.S. gives the following details of Australian lead production for the year ended June 30, 1949:

Company	Production Tons	% of Total
Zinc Corp., lead conc.	64,123	29.17
North Broken Hill, lead conc.	44,325	20.17
Mount Isa	38,547	17.54
Broken Hill South, lead conc.	33,546	15.26
New Broken Hill Cons., lead conc.	19,154	8.72
B.H.A.S., sundry purchased materials	7,722	3.52
Lake George (1947/48)	6,779	3.08
Electrolytic Zinc Co.	5,588	2.54
	219,784	100.00

Figures for Mount Isa, Lake George and Electrolytic Zinc Co. are stated to be estimates.

★Big pyrite deposits at Nairne, near Adelaide, are being investigated by Consolidated Zinc Corporation. Three to four test holes will be drilled to a depth of about 500 ft. The lode is several hundred feet wide.

REFRACTORIES
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1. Explains the development of refractories to meet new temperatures and conditions in industry. Covers their manufacture, testing and use, materials and equipment, many of the problems of manufacturer and user. *By F. H. Norton, M.I.T. 782 pages, 419 illus., $10.00.*

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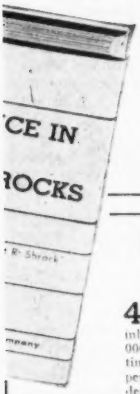
SEQUENCE IN LAYERED ROCKS



3. Here are new methods for determining the order of succession in layered rocks, especially where the strata are steeply inclined or vertical. Describes and illustrates all the common, and many of the uncommon, features in rocks of all kinds—sedimentary, igneous, or metamorphosed. *By R. Schrock, M.I.T. 507 pages, 397 illus., $7.50.*

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4. Gives the geologic history of North America and its inhabitants throughout 2,000,000,000 years of time. The time is divided into eras and periods and each division is described in order beginning with the oldest, and the plants and animals characteristic of each illustrated. *By R. Hussey, U. of Michigan. Second edition. 465 pages, 322 illus., $3.75.*

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IN THE PHILIPPINES

• Japan Contracts for More Iron Ore
• Baguio Seeks Loan

★The fourth contract for export of iron ore from the Philippine Islands to Japan has been signed by International Engineering Co., controlled by Soriano interests. Shipments will continue to be made principally from Philippine Iron Mines at Larap in the Paracale area. It is planned to reopen the Agusan iron deposit as well which was vigorously worked by Japanese contractors before the war. Samar Iron Mining Co. is producing 1,000 tons per day for shipment to Japan. The Gold Star iron mine on Marinduque Island, another prewar iron producer, has also been placed in operation.

Some consideration has been given by Philippine government officials to extending financial aid for erecting a small blast furnace for smelting domestic iron ores, using charcoal for fuel. Dr. George Waterhouse of the General Electric Co. has been in the Philippines making a survey of the iron ore industry for his company.

★Beginning June 1, Lepanto Consolidated started milling 1,000 tons a day in its remodeled mill, the capacity of which has been doubled. Ore reserves are fully adequate to support the increased milling rate. All equipment in the new mill has been operating smoothly with no time out for adjustment. Construction has been completed well ahead of the schedule originally laid out.

★At Surigao Consolidated development continues good. The block of ore on the 500-ft. level has not been completely delineated but appears to be of better grade than on the 400. It does not appear to be related to the ore shoot on the upper levels. Ore reserves show substantial improvement.

★Production at Atok-Big Wedge shows little change, averaging about 450 tons a day of $11.40 ore. Extension exploration and development work is going on. It is expected that the crosscut to the Keystone vein on the 11th level will be completed in June and results will have an important bearing on the future of the mine. The management is hopeful of finding more ore in the upper levels of the mine where there are 600 ft. of backs to the surface. Additional claims have been staked on the northern boundary of the property and permission has been granted to the company to explore within the Baguio city limits.

★Baguio Gold Mining Co. has asked for a valuation of its property by the Bureau of Mines, with a view to use its findings to obtain financing for a 400-ton mill. Direct assistance from the Philippine RFC is hoped for. The mine was an important independent gold producer before the war.

★Rehabilitation of the Marsman mines, San Mauricio, Itogon, and United Paracale is progressing. A 300-ton mill is being built for Itogon, with some equipment obtained from the old Masbate mill.

★Soriano engineers are diamond-drilling on the XYZ area, about 20 kilometers from the IXL mine on Masbate Island. If the drilling shows ore, it would be worked in conjunction with ore from IXL. Although IXL has a fair amount of ore reserves, it is feared it would not pay to unwater the mine and erect a mill unless an additional supply is found on XYZ, when the two properties could be operated by a central mill.

★Shipments of chromite from Masinloc in May totaled 24,000 tons valued at $240,000. With strong demand from the United States for this ore, it is expected that monthly shipments will continue at an increasing rate.

extra service for your equipment when

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Because of the hardness and other desirable characteristics of these alloys, they provide high resistance to all types of wear—abrasion . . . impact . . . heat . . . corrosion. One application often adds 2 to 25 times longer service life to *worn or new* parts . . . big dividends in savings of "down-time" and replacements.

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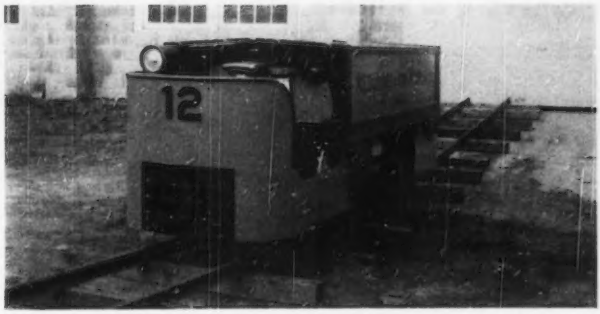
Headquarters for Oxygen, Acetylene and Other Gases . . . Calcium Carbide . . . Gas Cutting Machines . . . Gas Welding Apparatus and Supplies . . . Arc Welders, Electrodes and Accessories

STORAGE BATTERY LOCOMOTIVES

THE GREENSBURG "RANGER"



One of three, 4-ton, 24-inch gauge, "Ranger" locomotives operating at the Resurrection Mining Company, Leadville, Colorado. The locomotive can be built with either single or two motor drive.

All Locomotives CUSTOM-BUILT to your requirements

FEATURES

Oil-tight, non-leak transmission. Use regular auto oil; change every 6 months.

Strong, Simple, Low maintenance cost.

Extra-long journal springs assure better trackability.

Large motor, to assure more horsepower per ton weight of locomotive.

METAL MINES **COAL MINES** **INDUSTRIAL PLANTS**

GREENSBURG MACHINE COMPANY

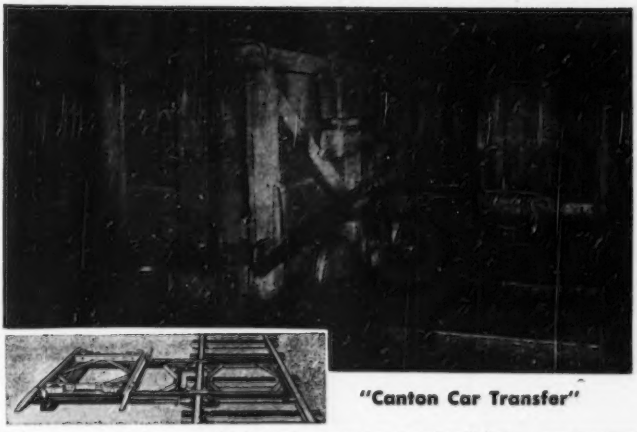
PHONE 5500 **GREENSBURG, PENNA.**

Load an entire train on single track

for PROFIT

Save Time
Save double track
with the

"Canton Car Transfer"...



"Canton Car Transfer"

THIS famous economy device can be installed on any track of gauge and rail now in use. Its operation is simplicity itself—pushing empty car on track by locomotive, then moved by hand to transfer section, permitting locomotive and cars to pass. Train is pulled out all at one time. Two men in two minutes can take down, to move the three units to new location when desired . . . no alterations required for track or rails. Timken Roller Bearings enable easy shunting of heavy cars to maximum weight of six tons. The Car Transfer speeds up loading, haulage, saves expensive double-tracking. Write for complete literature; please use street and zone numbers.

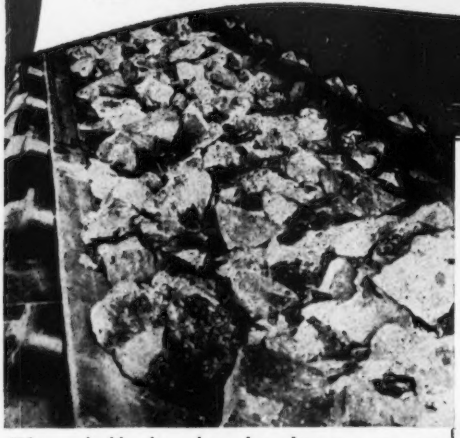
American Mine Door Co.

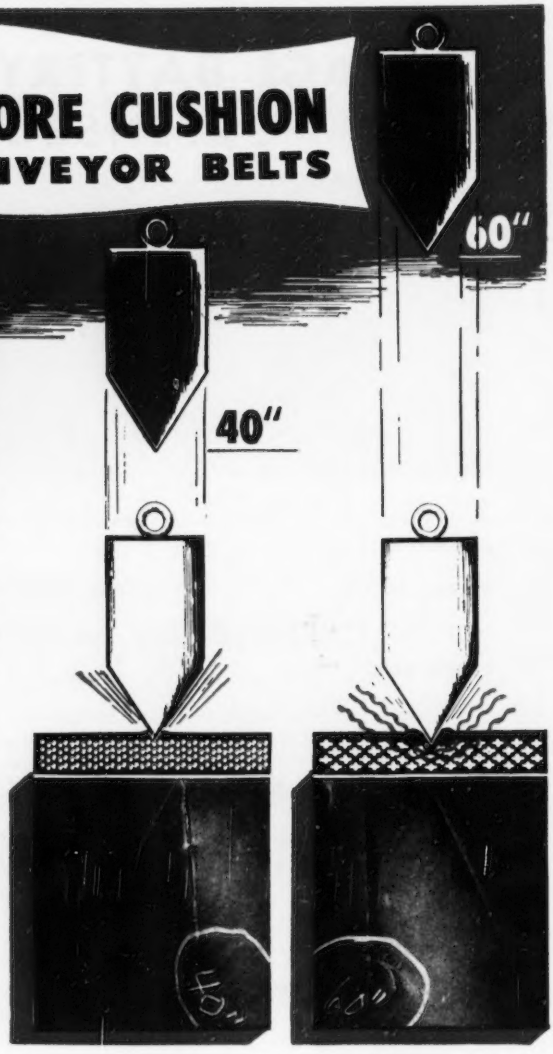
2039 Dueber Avenue
Canton 6, Ohio

Manufacturers of "Dustributors"; Automatic Switch Throws; Automatic Mine Doors; Mechanical Track Cleaners

"GUILLOTINE" TEST

Proves 50% MORE CUSHION in *Homocord* CONVEYOR BELTS





When rocks like those shown here drop on a conveyor belt, every shock at loading point shortens the life of the belt. To overcome this, extreme cushion and resilience are built into Homocord Conveyor Belts. This "Through-and-Through" Cushion gives Homocord Conveyor Belts longer life than any other belt.

To measure comparative cushion and shock-absorbing qualities, Raybestos-Manhattan engineers devised the "killer" test shown at right. A heavy metal weight, ground to a blunt edge is dropped from various measured heights until it ruptures the cover of the sample under test.

Notice the shock lines indicate how a regular conveyor belt's "boardy" resistance to impact leads to cover gouging and breakdown. The shock lines on the Homocord cross section show how "Through-and Through" cushion and resilience of the Homocords absorb impact without injury.

Homocord CUSHIONED CONSTRUCTION HAS 8 ADVANTAGES

1. Complete bonding of every member into a homogeneous structure.
2. Holds metal fasteners, with no loss of draw-bar strength.
3. Lateral flexibility permits perfect troughing, accurate training, reduces fatigue of flexing at bend in troughing idlers.
4. Resists destructive action of continuous or heavy impact feeding.
5. Cushion Homocord body and low inelastic stretch reduce wear and tear of top cover.
6. Homocord body reduces hazard of punctures.
7. The Homocords are completely encased in Flexlastics; moisture not admitted, mildew cannot start.
8. Longer life, lower cost per ton.

REGULAR DUCK BELT

Unretouched photo shows actual rupture results of a 40" Guillotine Drop Test on a conventional 4-ply 32-oz. duck belt with 1/8" top cover, 1/16" bottom cover. With little cushion to absorb impact, the cover ruptures and deterioration sets in.

Homocord

Unretouched photo shows comparable degree of impact effect from a 60" Guillotine Drop Test on a 4-ply AEH Homocord Conveyor Belt with 1/8" top cover and 1/16" bottom cover. Impact of falling weight is dissipated through the Homocords, cushioned in Flexlastics.

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose • Fan Belts • Brake Linings • Brake Blocks • Clutch Facings • Packings • Asbestos Textiles • Powdered Metal Products • Abrasive & Diamond Wheels • Bowling Balls

Crammed with outstanding features of safe and efficient operation! Air Bar Feed converts hand-feed Drifters—yes, and Sinkers too!—to fast efficient POWER FEED! Six speeds forward and reverse!

Fool proof Pneumatic Column simplifies drifting set-up. Built to stand up longer under severe use than anything in its class today!

Illustrated circular No. JE1132 tells complete story of these and other new cost-saving Thor air operated mining tools. Send for it today!

The new Thor Pneumatic Column and Air Bar Feed have been tested and approved at leading mines! Order one or both in on trial today. Prove by your own tests that never before have such tremendous savings been made available to operators of large and small mine drifting operations! Independent Pneumatic Tool Co., Aurora, Illinois

Thor PORTABLE POWER TOOLS

ELECTRIC • PNEUMATIC

Cutting Costs with TELSMITH Equipment

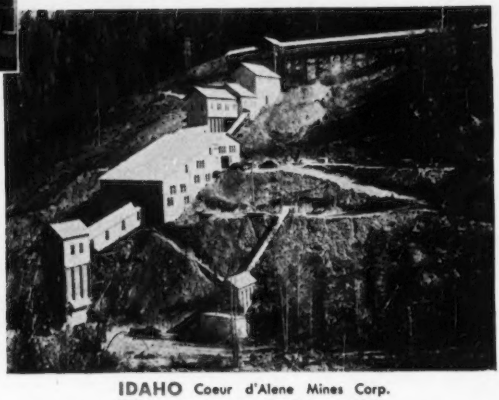
ARIZONA Mill of Shattuck-Denn Mining Corporation, at Bisbee, Arizona

These mills have found the practical ways to cut costs today—through more efficient production . . . with new methods and new machines or by properly planned plant modernization. They use Telsmith modern crushers, feeders and screens to get increased plant capacity and a finer product. Telsmith equipment also means lowest power requirements . . . less supervision . . . minimum upkeep expense. Consult Telsmith engineers. No cost or obligation, of course. *Send for Bulletin 266.*

COLORADO Mill of Shenandoah-Dives Mining Co., Silverton, Colorado

CALIFORNIA Castro Chrome Associates chrome concentrating plant near San Luis Obispo

MINNESOTA Virginia Mine at Eveleth, Minn., operated by Snyder Mining Co., Duluth



IDAHO Coeur d'Alene Mines Corp. 600-ton capacity mill near Osborne, Idaho

NEVADA Consolidated Challar-Gould & Savage Mining Co., Virginia City

MIN-31R

SMITH ENGINEERING WORKS, 502 E. CAPITOL DRIVE, MILWAUKEE 12, WISCONSIN

Cable Address: Sengworks, Milwaukee

Samuel Osborn (S. A.) Ltd. Johannesburg, So. Africa — Armco International Corp. Buenos Aires, Argentina — 51 East 42nd St. New York 17, N. Y. — 211 W. Wacker Dr. Chicago 6, Ill. — Mine & Smelter Supply Co. Denver 17, Colo.

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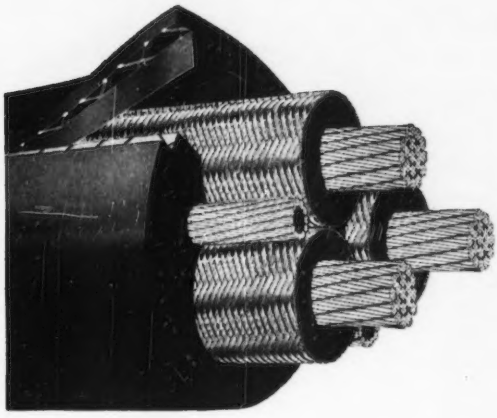
It's Butyl-Insulated!

SECURITYFLEX type SHD

Better for your high-voltage, heavy-duty big shovel jobs!



The newly improved Securityflex* Type SHD is better because it's BUTYL-INSULATED for superior electrical and mechanical characteristics. It stands up better under compression and mechanical abuse, has increased moisture resistance and much higher heat resistance (rated at 80°C.).

Better because it has a new "copper-cotton" combination shield that

means faster, easier splicing
eliminates chafing failures

Better because the patented grounding wires are rubber-cored. That means grounding wires that

will not kink
have larger diameter for greater contact with conductor shield
provide cushioned construction that won't cut insulation

It all adds up to a much more rugged shovel cable. For more information on Securityflex Type SHD, get in touch with your nearest Anaconda Sales Office or Anaconda Distributor. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York. 50314

*Reg. U. S. Pat. Off.

the right cable for the job ANACONDA® WIRE AND CABLE

Lower your costs with these *McCarthy* shot-hole *Drills*

● McCarthy Blast Hole Drills bore shale and rock formations to produce deeper and truer blast holes in less time with less effort.

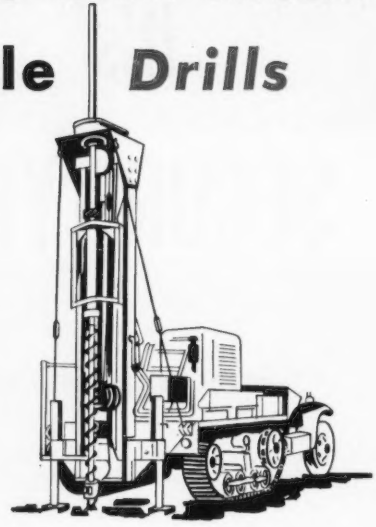
McCarthy Drills have heavier, more ruggedly built frames, with finger-tip controls, heavy-duty transmissions and alloy steel gears and shafts. Each unit is provided with an abundance of power, supplied from gasoline, diesel or electric motors.

Simplified designing permits increased mobility of both horizontal and vertical models . . . makes McCarthy the favorite in the field . . . the top performer of them all!

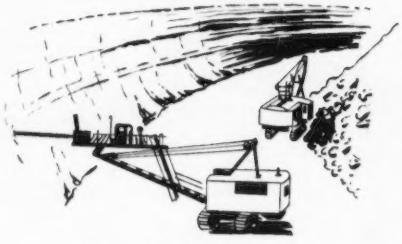
For high speed, high level drilling, there's the McCarthy Horizontal Drill for mobile mounting; there's a Self-Propelled, highly maneuverable unit for drilling blast holes close to the floor or bottom; and a compact, powerful Vertical Drill with a hydraulic tower that folds flat for travel.

Each of these McCarthy Drilling Units was developed for a specific job. Rigid tests prove conclusively that McCarthy Drills produce more footage at less cost than any other drills on the market.

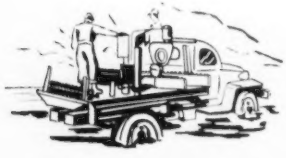
Make the Salem Tool Company headquarters for all your drilling needs. Write now for information about how McCarthy Drilling equipment can increase your production and lower your blast hole drilling costs.



Vertical Drill Mounted on Half Track

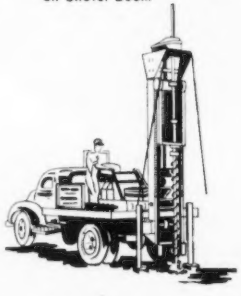


Horizontal Blast Hole Drill Mounted on Shovel Boom



Truck Mounted Blast Hole Drill

Self-Propelled Blast Hole Drill



Vertical Blast Hole Drill

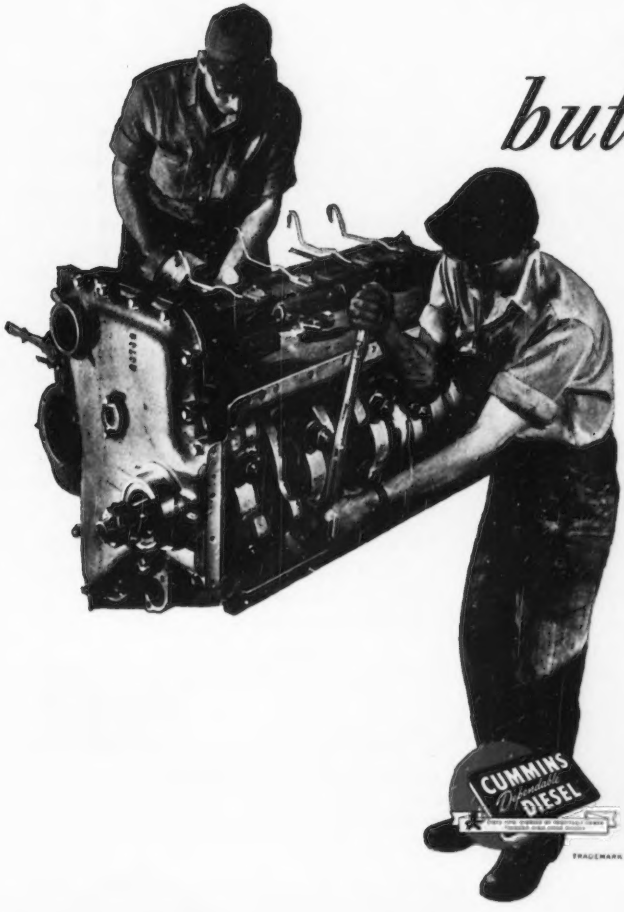
THE SALEM TOOL COMPANY

771 SOUTH ELLSWORTH AVENUE SALEM, OHIO, U. S. A.

Cummins® Custom-built Diesels

Built not once

but Twice



The better-built engine for more profitable power

Yes, they're actually built *twice*. That's what makes a lightweight, high-speed Cummins Diesel such an efficient, dependable, precision-made engine. After initial assembly, each engine is run-in on the test block. Then it is torn down and carefully re-inspected—after that it is re-assembled and tested *again* to assure *peak performance.*

The finest of engine craftsmanship . . . exclusive Cummins fuel system . . . engines that are "custom-built to fit the job" . . . make a Cummins Diesel *a better buy for your power needs.*

Contact your Cummins dealer. He has more facts to show you about making more profits with

Diesel power by CUMMINS

TRADEMARK REG. U. S. PAT. OFF.

CUMMINS ENGINE COMPANY, INC. • COLUMBUS, IND.

EXPORT: CUMMINS DIESEL EXPORT CORPORATION
Columbus, Indiana, U. S. A. • Cable: Cumdiex

Lightweight High-speed Diesel Engines (50-550 hp) for: On-highway trucks • off-highway trucks • buses • tractors • earth-movers • shovels • cranes • industrial locomotives • air compressors logging yarders and loaders • drilling rigs • centrifugal pumps generator sets and power units • work boats and pleasure craft.

LIMA RUGGEDNESS and DEPENDABILITY make GREATER PROFITS possible

● The narrower your margin of profit, the more important to you that your equipment be designed and built for maximum output and continuous, dependable, trouble-free service.

That's why LIMA Shovels, Cranes and Draglines are ideal for quarry and open-pit mining operations. Simplicity of design means fewer parts to get out of order. Important bearings are anti-friction type. Large drums increase output and minimize cable wear. Permanently aligned shafts prevent chattering and grabbing of clutches. Large clutches and brakes reduce lining wear. Extra rugged machinery base, truck and front-end equipment provide ample strength for heavy, punishing service.

These are only a few of the reasons why LIMA machines are your best investment when profits depend upon low operating and production costs.

The LIMA line includes Shovels ¼ to 6 yards, Cranes to 110 tons, and Draglines variable. Rubber-mounted truck cranes in 20 and 35 ton capacities

Lima Shovel and Crane Division

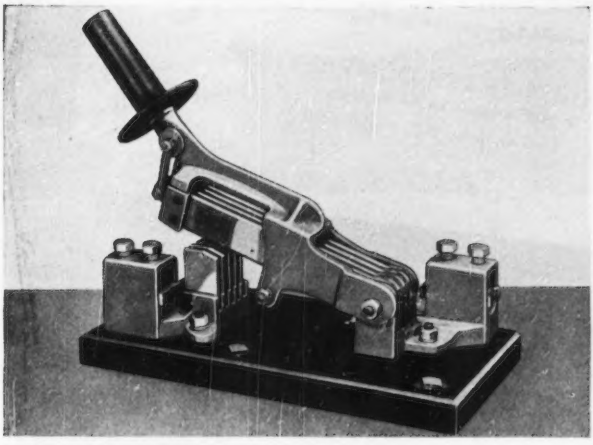
LIMA, OHIO

OTHER DIVISIONS: *Lima Locomotive Works Division; Niles Tool Works Co.; Hooven, Owens, Rentschler Co.*

LIMA HAMILTON CORPORATION

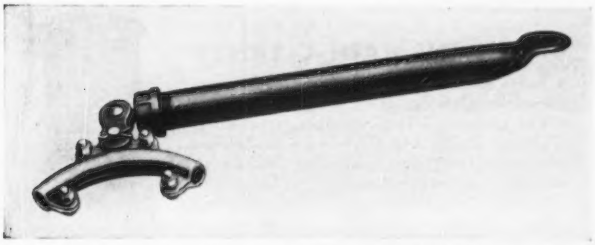
CUT YOUR HAULAGE SYSTEM COSTS

WITH THESE NEW MOSEBACH PRODUCTS



Mesco Heavy Duty Feeder Switches are designed for 750 to 1500 ampere applications. Handles equipped with "quick-break," "quick-make" springs. Available in wood or steel boxes, suitable for mounting in any position. Universal Terminals accommodate feeder cables from 250,000 to 1,000,000 CM in size.

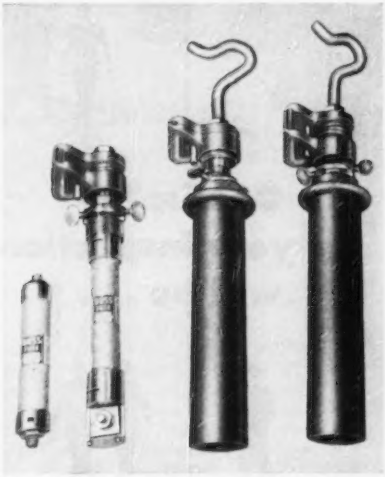
Mesco Hydraulic Brake Adjustors are adaptable to most locomotives. Made in any desired length from 10" rod centers up. Can be instantly adjusted, anywhere, at anytime . . . wherever a grease gun is available. (Using any standard gun, motorman can handle adjustment.) Rugged . . . safe . . . eliminates sudden "let-downs". . . easy to install.



Mesco Shock Absorber was developed for shuttle car use, but, with adjustments, can be used on other mine machinery. "Dead-ends" cables and allows slack for connecting cables to junction boxes or other power sources. Protects cables . . . limits splicing operations . . . saves time. Can be securely bolted to roof or chained to timbers or rail. Recommended for use on electrical, hydraulic or clutch-driven reels.

Each one of these new MESCO products has been carefully engineered to help you get the highest possible efficiency from your haulage system equipment. They offer you exclusive, money-saving advantages found in no other products of their type and are well worth your immediate investigation.

These new MESCO products are part of our complete line of track and trolley products, which include MESCOWELD rail bonds, section switches, and trolley wheels. For information see your nearest distributor or write direct.



MESCO Clamp Type Trolley Taps feature a heavy bronze 2¾" long clamp which holds the trolley wire firmly and positively for working in one locality for a definite period of time. Actuated by an Acme thread which cuts dirt and rock dust. Accommodates either stud type or ferrule type one-time, powder-packed fuses.

MOSEBACH ELECTRIC & SUPPLY CO.
1115 Arlington Ave., Pittsburgh 3, Pa.
HEmlock 1-8332

See our exhibit at Booth #714 at Metal Mining Show, Salt Lake City, August 28-31

Get the facts in Salt Lake City!

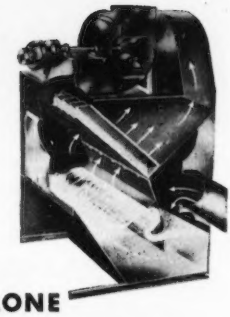
You are cordially invited to visit Booth No. 505
at the 1950 Metal Mining Convention and Exposition, Aug. 28 thru 31
to inspect the latest developments in
Roto-Clone Dust Control Equipment and Cycoil Air Cleaners

AMERICAN AIR FILTER COMPANY, INC.
193 Central Avenue, Louisville 8, Ky.
In Canada: Darling Bros., Ltd., Montreal, P. Q.

On display for your inspection will be . . .

TYPE N ROTO-CLONE

A Hydro-Static Precipitator in which dust is separated from the air by means of a water curtain. Combined washing and scrubbing action results in high efficiencies with all types of dust. Available in capacities from 750 to 45000 CFM.

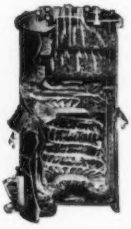


TYPE D ROTO-CLONE

A Dynamic Dust Precipitator combining the functions of exhauster, dry dust separator and dust storage hopper in a simple, compact, self-contained unit. Available in capacities from 200 to 15000 CFM.

CYCOIL OIL BATH CLEANER

A heavy-duty air cleaner designed for compressor and engine service. Cycoil provides 4-way cleaning—impingement, scrubbing, cyclonic action and filtering—to deliver practically 100% dust removal in addition to serving as an intake silencer.

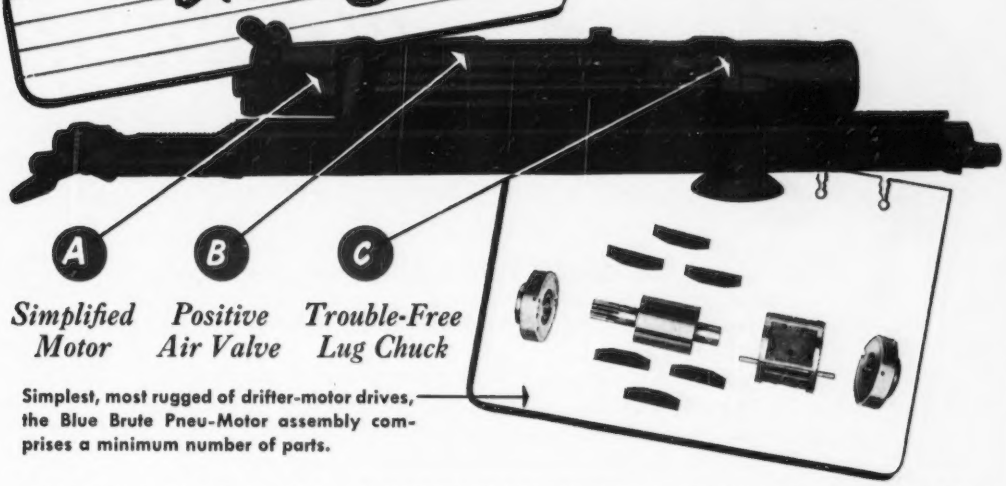


AAF

ROTO-CLONE® DUST CONTROL EQUIPMENT

The "A·B·C" of Faster, Lower Cost Drilling

Only **BLUE BRUTE** *Drifters Offer You This Performance-Boosting Construction at Three Key Points!*



Simplified Motor *Positive Air Valve* *Trouble-Free Lug Chuck*

Simplest, most rugged of drifter-motor drives, the Blue Brute Pneu-Motor assembly comprises a minimum number of parts.

Motor, valve and lug chuck — when these three drifter-elements pull together smoothly, you're on your way to yardage records! And in Blue Brute Drifters you can count on these key features for non-stop dependability on the toughest jobs you'll ever meet up with. Here's why:

(A) Pneu-Motor . . . Not "adapted" from some other air equipment, but especially designed for Blue Brutes, the Worthington Pneu-Motor is a standout for ruggedness — and the simplest drifter motor made. Parts are larger and fewer, assuring top wear-resistance and freedom from work-halting breakdowns.

(B) Valve Assembly . . . A famous Worthington "exclusive" that has won the tribute of being copied. But for checking wear and reducing air consumption, no other valve — copy or not — has ever equalled the positive-acting, end-seating Blue Brute valve.

(C) Lug Chuck . . . In Blue Brute Drifters the one-piece chuck sleeve reduces friction, holds alignment better, allows the piston to hit cleaner and harder. Worth considering when you remember that the chuck area is a major trouble-spot in ordinary drifter design.

Continuing the Blue Brute feature story, there's the scientific balance . . . the freedom from vibration . . . and the short-stroking under heavy loads that reduces the stuck-steel nuisance...all of which speed up drilling cycles, cut operating costs and keep operators happy.

Why not let *your* miners try Worthington Drifters — the WPM (Pneu-Motor on drifter), the WPMS (Pneu-Motor on shell) or the WHC (Hand Crank). Meanwhile, for further facts proving *there's more worth in a Blue Brute*, write for literature on the complete line.

BUY BLUE BRUTES

110-6

See Worthington's Exhibit in Building 8, Spaces 129 and 133 at Salt Lake City, Mining Show.

Semi-Portable Compressors. Drifters with Feed Motor Incorporated. Drifters with Feed Motor on Shell. Hand-Crank Drifters. Stopers. Hand-Held Rock Drills.

WORTHINGTON

Worthington Pump and Machinery Corporation
Construction Equipment Department
Harrison, New Jersey

Distributors In All Principal Cities

are businessmen

COLD-BLOODED?

OF COURSE NOT! Literally, their normal body temperature is 98.6—same as laborers, engineers or any other group of people. And, figuratively, they're no more, or no less, cold-blooded—as a group.

We all know unreasonable generalizations can be dangerously false. Common sense and on-the-job experience show us the value of dealing specifically with ideas, problems—and *people.*

Let's not make the big—and costly—mistake, then, of generalizing on religious or racial groups. Adopt and *carry out* these common sense principles:

1. Accept—or reject—people on *their individual worth.*
2. Don't listen to or spread rumors against a race or a religion.
3. Speak up, wherever we are, *against* prejudice. Work for understanding.

A PUBLIC SERVICE PROJECT ★ THE ADVERTISING COUNCIL

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at the Metal Mining Convention — Salt Lake City • August 28 to 31

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See the new developments and the leading standard products in mine safety equipment

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the **Edison**
R·4 ELECTRIC CAP LAMP

You'll be cordially welcome!

MINE SAFETY APPLIANCES COMPANY

BRADDOCK, THOMAS AND MEADE STREETS . . . . . PITTSBURGH 8, PA.

At Your Service: 48 BRANCH OFFICES in the UNITED STATES

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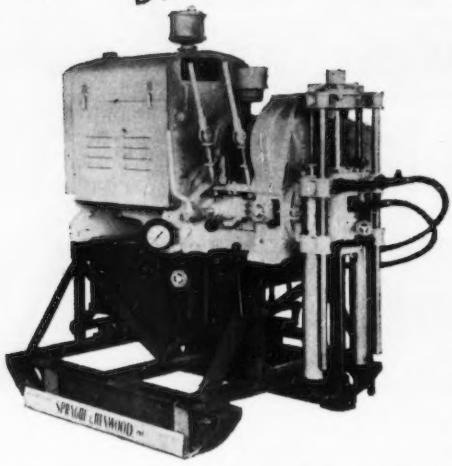
Representatives in Principal Cities in Mexico, Central and South America. CABLE ADDRESS: "MINSAF" PITTSBURGH

A bright star in your drilling future...

SPRAGUE & HENWOOD "40-C"

DIAMOND CORE DRILLING MACHINE



AMPLE
CAPACITY
POWERFUL
DEPENDABLE
RUGGED

Sprague & Henwood Model 40-C Core Drilling Machine with Oil Operated Hydraulic Swivelhead

NO FANCY WORDS ARE NECESSARY to describe Sprague & Henwood Core Drilling Machines. Years of experience in the field, under all types of conditions, have played a large part in the design and construction of these modern Core Drilling Machines. The Mining Man's point of view has been considered in all features that make Sprague & Henwood Equipment such a bright star in any drilling program.

Steel Castings of highest grade. machine-cut gears, and wide use of alloy steels combine to produce units that will render "TOP" service over long periods of continuous operation at low cost. Time loss due to break-downs is held to a minimum, and replacements are few.

Sprague & Henwood Core Drills can be supplied in several combinations of Swivelhead and Power units. A choice can be made of Screwfeed of Hydraulic Swivelhead and Gasoline engine, Diesel engine, Air engine, or Electric Motor power units. Additional information and individual characteristics of any unit is available on request. We invite your inquiry.

CORE DRILLING BY CONTRACT

Sprague & Henwood, Inc. are also prepared to undertake Core Drilling by Contract. This includes test boring or mineral prospecting and also foundation exploration for dams, bridges, buildings, etc.

Drilling grout holes and grouting is also performed on contract basis. Thoroughly experienced supervisors and operators are available for contract drilling operations. Send us your inquiries for Core Drilling by contract.

SPRAGUE & HENWOOD, Inc., SCRANTON 2, PA.

NEVER BEFORE

A Supreme Highway Tire with "Off-the-Road" Traction Never Possible Before!

NOW YOU HAVE THEM

- **FOR ON-AND-OFF-THE-ROAD PERFORMANCE** *never known before*
- **FOR NON-SKID SAFETY** *never known before*
- **FOR ALL-ROAD, ALL-LOAD MILEAGE** *never known before*
- **WITH JOB-FITTED TREAD COMPOUNDS** *never known before*

JOB FITTED TO YOUR EXACT REQUIREMENTS

No More Layovers That Waste Away Profits

★ **FROM LOADING IN THE SAND-PIT AND GUMBO TO SMOOTH HIGHWAY ROLLING**—*Job fitted—One and the same tire*

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The Great On-and-Off-the-Road Fleets Welcome the Great Job-Fitted Fleetmasters That Save Money and Build Up Profits

The Great New Mid-Century

U. S. ROYAL FLEETMASTER

U.S. ROYAL TIRES

UNITED STATES RUBBER COMPANY

(A Quick Quiz on modern pH advancements)

Do you know these important facts about BECKMAN pH CONTROL?

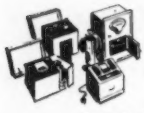
Do you know...

That Beckman pioneered modern glass electrode pH equipment?

Until Beckman pH instruments were developed, glass electrode pH equipment was a cumbersome, complicated laboratory curiosity. It was Beckman that pioneered today's simple, compact, highly accurate and completely dependable glass electrode pH equipment!

That Beckman pioneered virtually every major development in modern glass electrode pH equipment?

Such far-reaching advancements as the High pH Glass Electrode . . . the High Temperature Glass Electrode . . . the Unusually Rugged "X-9" Glass Electrode . . . as well as a wide range of other vitally important advancements in glass electrode pH instrumentation, were *all* pioneered by Beckman. *Many of these advancements are still available exclusively in Beckman equipment!*



That Beckman offers the industry's most complete line of glass electrode pH instruments?

Included in the complete Beckman line are instruments specially designed to combine the high precision and wide versatility necessary for advanced research, medical and laboratory applications . . . others that combine maximum simplicity and high accuracy with complete portability for plant and field applications . . . still others that combine maximum simplicity and high accuracy with the plug-in convenience of full AC operation . . . plus *completely automatic* pH equipment for continuous pH indication, recording and control on large-scale processing applications.

That Beckman also provides the industry's most complete line of modern glass electrodes?

Although glass electrode pH instruments are the most efficient pH equipment obtainable, no glass electrode pH instrument is better than the versatility, accuracy and dependability of the electrode assemblies available for use with it.

Beckman provides the industry's most complete line of glass electrodes for use with Beckman pH instruments—a type of electrode assembly to meet every industrial, research, laboratory and field requirement!

That there are so many money-saving applications for Beckman pH control that you may be losing important profits unless you make a complete investigation of your operations?

There is pH wherever there's water, water solutions, moist pastes, sludges, slurries or other moisture-containing substances. And wherever there is pH, chances are the operation can be done better . . . with greater uniformity and less waste at lower overall cost . . . by Beckman-controlling the pH of the various processing operations.

WHETHER *you manufacture food products or treat sewage . . . do metal plating or refine crude oil . . . make textiles or process ore — in fact, no matter* WHAT *your field of operation . . . if you have not yet determined whether Beckman pH Control can be used to advantage in your operations — possibly is already* BEING *used to cut costs by your competitors — let us study your processes and make helpful recommendations. No obligation, of course.* BECKMAN INSTRUMENTS, NATIONAL TECHNICAL LABORATORIES, SOUTH PASADENA, 27, CALIFORNIA.

For an informative, non-technical outline of modern pH control — what it is and how it's used — send for this free booklet "What Every Executive Should Know About pH."

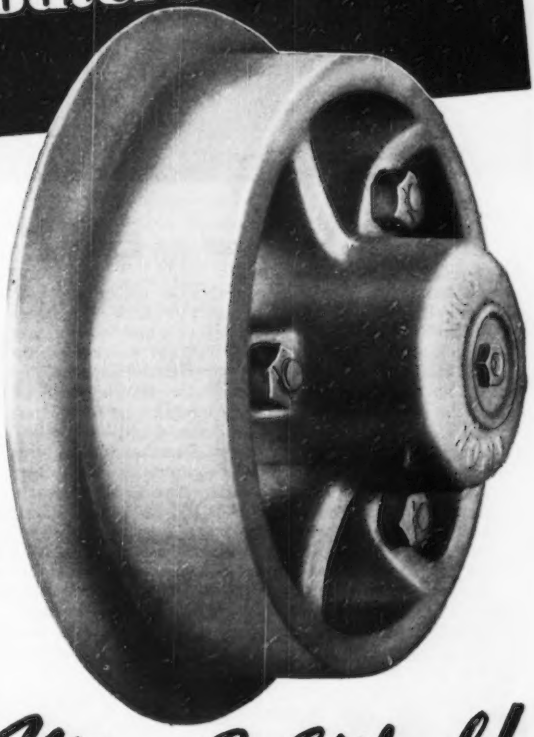
BECKMAN

INSTRUMENTS CONTROL MODERN INDUSTRIES

pH Meters and Electrodes — Spectrophotometers — Radiation Meters — Special Analytical Instruments

Performance records prove...

...with practically no maintenance..you'll haul up to 50% greater loads on S-D "Floaters"...



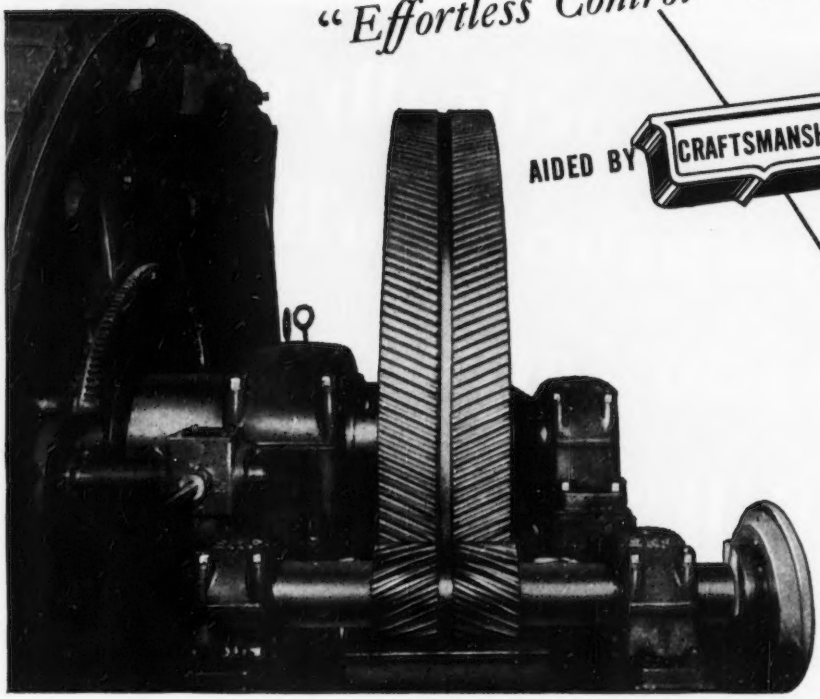
Tests conducted by independent engineering firms and performance records at the mine have proved that locomotives will pull up to 50% greater loads, when cars are equipped with S-D "Floater" Wheels, instead of wheels with other types of precision bearings. But this saving in power and time is only a portion of the profit you gain by using S-D "Floaters." When it comes to maintenance you really pick up profit because S-D "Floaters" literally "hate to be greased." One greasing in 5 years is often sufficient. Common labor can demount and remount a "floater" wheel easily . . . in less time than it takes to smoke a cigarette, because no adjustment whatsoever is necessary on the bearings. Add to this the fact that the big cause of bearing failure (bearings running too tight or loose) has been eliminated and you can understand why more and more operators are specifying S-D "Floaters" for all wheel replacements. For complete information, write Sanford-Day Iron Works, Knoxville, Tenn.

America's No. 1 Mine Car Wheel!

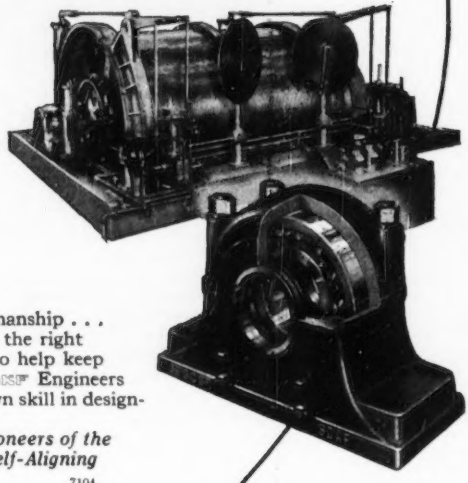
SANFORD - DAY IRON WORKS

"*Effortless Control*" IN MINE HOISTS

AIDED BY CRAFTSMANSHIP IN BEARINGS



bearings engineered by **SKF**



Vulcan Iron Works designed this highly efficient mine hoist to provide the operator with "effortless control" . . . grouped operating levers and instruments at a control desk. And they've kept friction at the minimum by using seven SKF SDAF Heavy-Duty Pillow Blocks with Spherical Roller Bearings. Four of the SKF Pillow Blocks are installed on the pinion shaft . . . three on the main drum shaft. For many years, SKF Ball and Roller Bearings have been first choice of builders of equipment that must operate uninterruptedly under the toughest sorts of conditions. They know that thanks to SKF Craftsmanship . . . built up from priceless experience in pioneering exactly the right bearing for the right job . . . they can bank on SKF to help keep friction and power consumption at the minimum. Let SKF Engineers show you how SKF Craftsmanship can augment your own skill in designing for greater operating efficiency and economy.

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA., *the Pioneers of the Deep Groove Ball Bearing, Spherical Roller Bearing, Self-Aligning Ball Bearing.*

7104

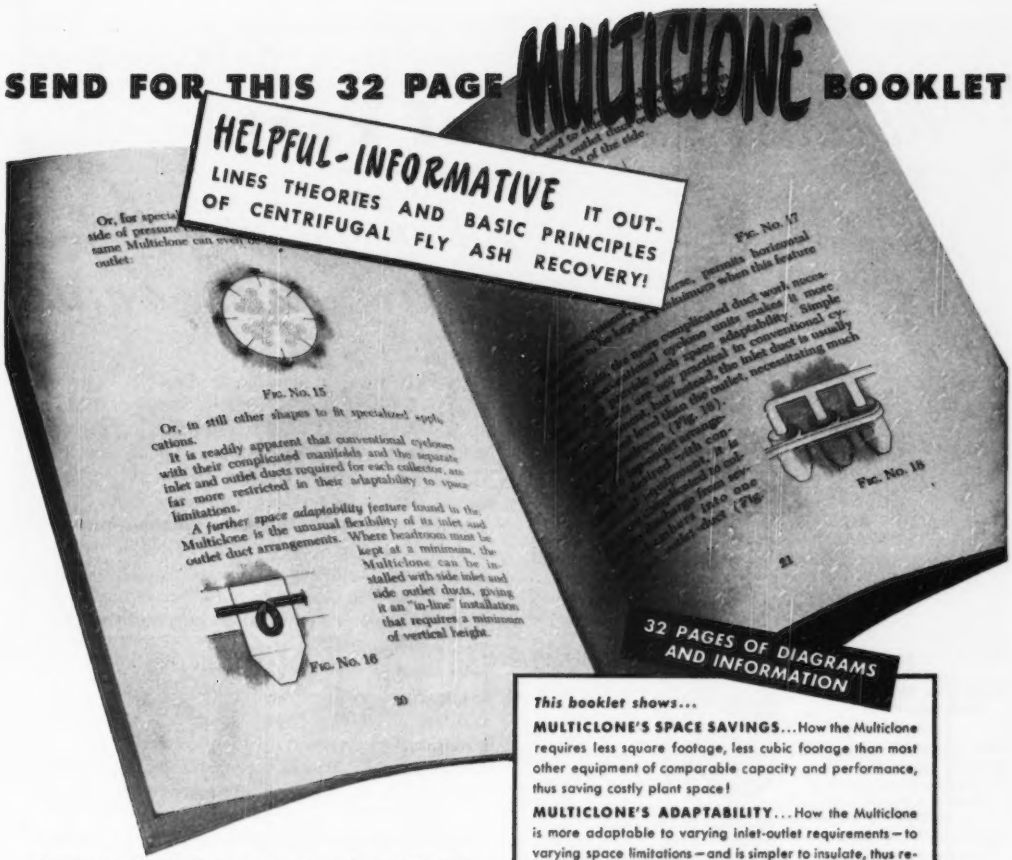
SKF

BALL AND ROLLER BEARINGS

8 REASONS WHY SKF IS PREFERRED BY ALL INDUSTRY

INTEGRITY · METALLURGY · TOLERANCE CONTROL · SURFACE FINISH · PRODUCT UNIFORMITY · ENGINEERING SERVICE · FIELD SERVICE

SEND FOR THIS 32 PAGE MULTICLONE BOOKLET


HELPFUL-INFORMATIVE IT OUTLINES THEORIES AND BASIC PRINCIPLES OF CENTRIFUGAL FLY ASH RECOVERY!
FIG. No. 15
Or, in still other shapes to fit specialized applications.
It is readily apparent that conventional cyclones with their complicated manifolds and the separate inlet and outlet ducts required for each collector, are far more restricted in their adaptability to space limitations.
A further space adaptability feature found in the Multiclone is the unusual flexibility of its inlet and outlet duct arrangements. Where headroom must be kept at a minimum, the Multiclone can be installed with side inlet and side outlet ducts, giving it an "in-line" installation that requires a minimum of vertical height.
FIG. No. 16
20
FIG. No. 17
FIG. No. 18
21
32 PAGES OF DIAGRAMS AND INFORMATION

NO MATTER whether you are now using mechanical dust recovery equipment or are planning the installation of such equipment at some future date, here is a booklet that is full of helpful and valuable information on centrifugal dust recovery. It not only explains the basic methods and principles involved, but also shows the important differences between small and large diameter separating tubes, shows how to simplify your duct work and reduce installation costs, and outlines many other important factors to be considered in selecting mechanical dust recovery equipment.

In addition, this informative booklet illustrates and explains how MULTICLONE'S unique *vane* design is fundamentally different...how it makes possible greater compactness, simpler installation, high recovery of the small particles as well as the medium and coarser ones, and many other facts on MULTICLONE advanced design.

A limited supply of these booklets is available for free distribution to those interested in mechanical recovery equipment and methods. Write for your copy today.

This booklet shows...

MULTICLONE'S SPACE SAVINGS...How the Multiclone requires less square footage, less cubic footage than most other equipment of comparable capacity and performance, thus saving costly plant space!

MULTICLONE'S ADAPTABILITY...How the Multiclone is more adaptable to varying inlet-outlet requirements—to varying space limitations—and is simpler to insulate, thus reducing installation costs!

MULTICLONE'S EFFICIENCY...How Multiclone's multiple *small diameter* tubes, made possible by its exclusive vane design, give higher centrifugal forces and more complete cleansing of *all* suspended particles—even small ones of 10 microns and less!

MULTICLONE'S LOW MAINTENANCE...How the Multiclone has no high speed moving parts to repair or replace, no pads or filters to clean or renew, nothing to choke gas flow or increase draft losses as suspended materials are recovered. Multiclone draft losses remain uniformly low—recovery efficiencies uniformly high—at all times!

Make sure that a copy of this helpful booklet is in your reference files by sending for your copy now!

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MULTICLONE Collectors
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Send the Right Message to the Right People

Paid subscriptions and renewals, as defined by A.B.C. standards, indicate a reader audience that has responded to a publication's editorial appeal. With the interests of readers thus identified, it becomes possible to reach specialized groups effectively with specialized advertising appeals.

THERE is no substitute for FACTS. That goes for measuring advertising values or making laboratory tests of materials for your factory. When you buy advertising space in a publication you have a cash investment in every copy of the issue that carries your sales message. Obviously some of the people who receive the paper are better prospects for your goods and services than others. Thus the distribution of your advertising, via the publication, becomes a No. 1 factor in the success or failure of your investment. To appraise a publication's advertising value to your business therefore it is necessary to have all the facts about its circulation.

Factual information regarding the identity, quality and size of business paper audiences is available to advertisers in the reports issued by the Audit Bureau of Circulations. The Bureau, a cooperative association of 3300 advertisers, advertising agencies and publishers, has established standards for measuring circulations—maintains a staff of experienced circulation auditors to audit the circulations of publisher members—issues the information thus obtained in A.B.C. reports for space buyers to use in evaluating, comparing and selecting media.

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By using the audited information in A.B.C. reports in connection with market facts you can accurately judge media for its advertising value to your business. This business paper is a member of the Audit Bureau of Circulations. Ask for a copy of our A.B.C. report and then study it.

McGRAW-HILL publications

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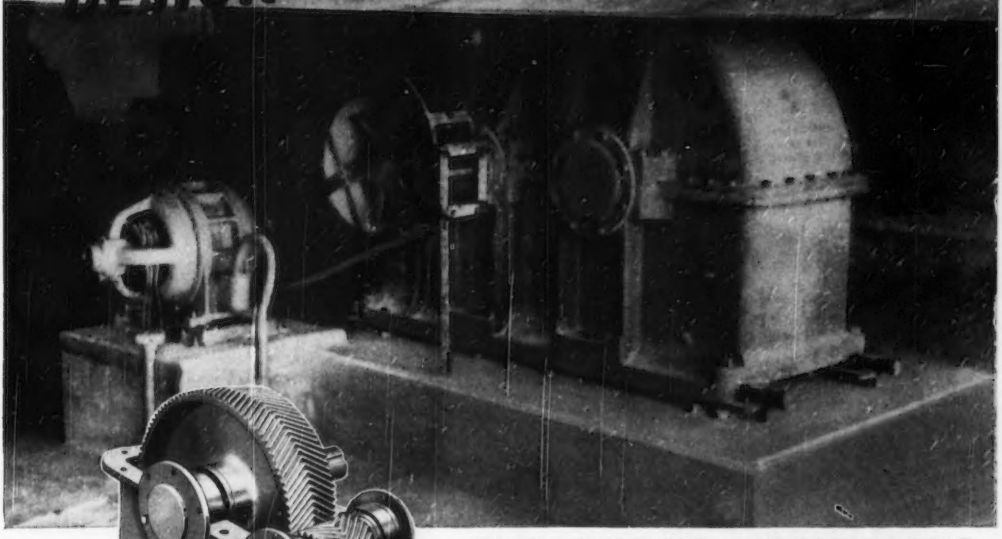
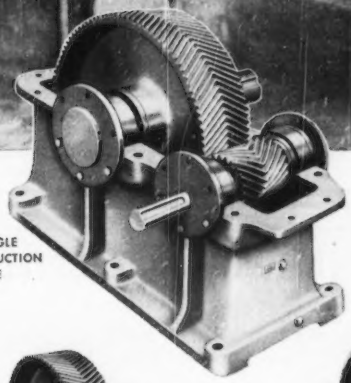


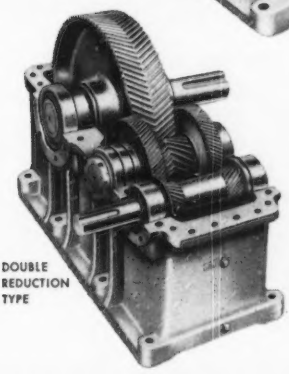


SINGLE REDUCTION TYPE

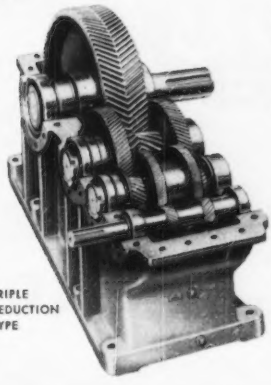
PHILADELPHIA HERRINGBONE SPEED REDUCERS

Because of symmetry of design of these units, the bearings share the load equally. This well planned construction permits the use of 2 standard bearings on each shaft, rather than the usual offset design. The balanced arrangement of the gears further reduces shaft stresses and eliminates end thrusts.

Philadelphia Herringbone Reducers are built in single, double and triple reductions, depending upon the number of gear trains used. Each type covers a wide range of sizes and ratios . . . as standard ratios are from 1.75 to 1 up to 320 to 1, practically any equipment can be provided with the correct operating speeds. These units are also ideal for speed increasing. Efficiencies are obtained up to 98%.



DOUBLE REDUCTION TYPE



TRIPLE REDUCTION TYPE

For complete details about Philadelphia Herringbone Units, send for catalog H-49 . . . use your business letterhead, please.

Philadelphia Gear Works, INC.

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.

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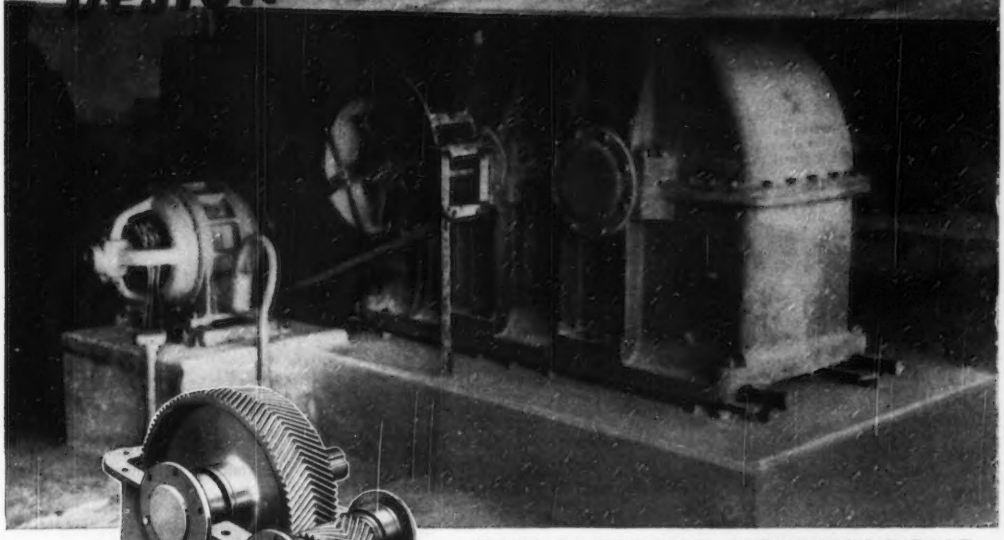

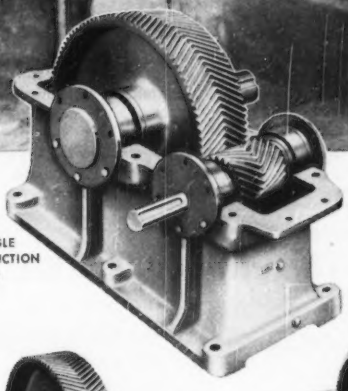

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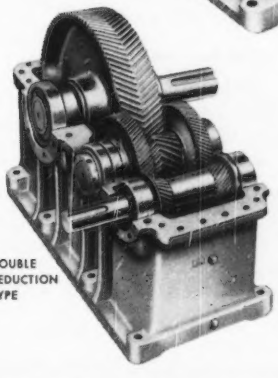

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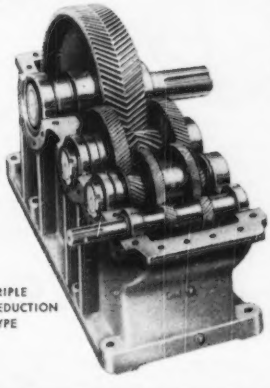

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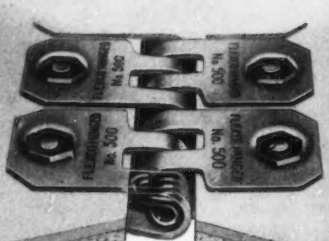

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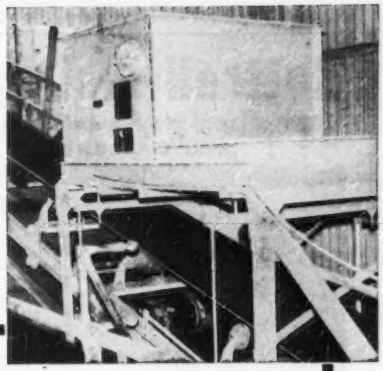

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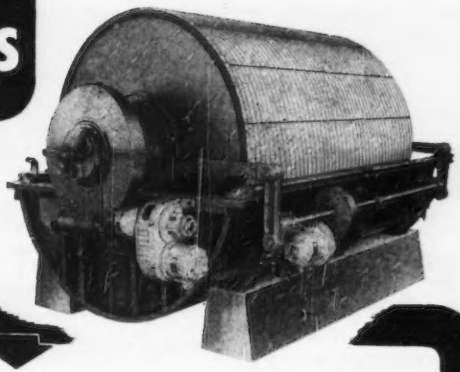

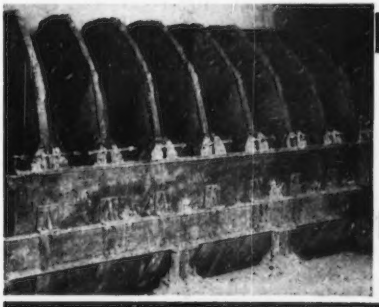

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Write for Bulletin No. 4710

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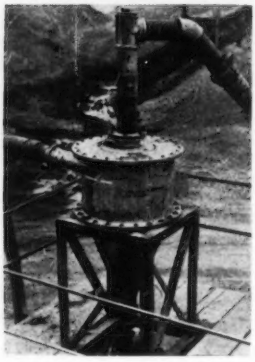
ESTABLISHED 1898 DENVER, COLORADO, U. S. A. (CABLE MORSE)

Cottrell Whirlcone

Sensational New Separating Cone and Concentrator



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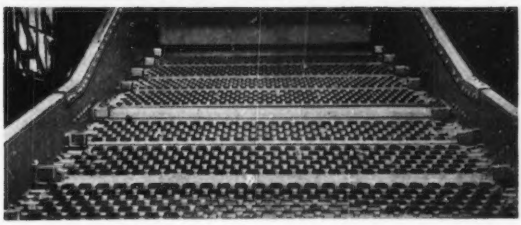

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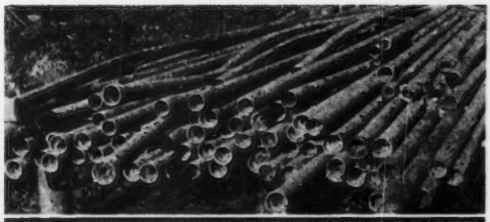

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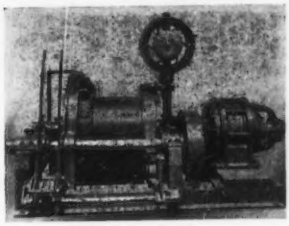

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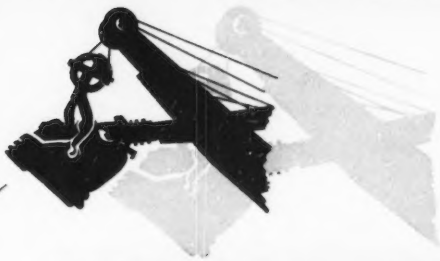

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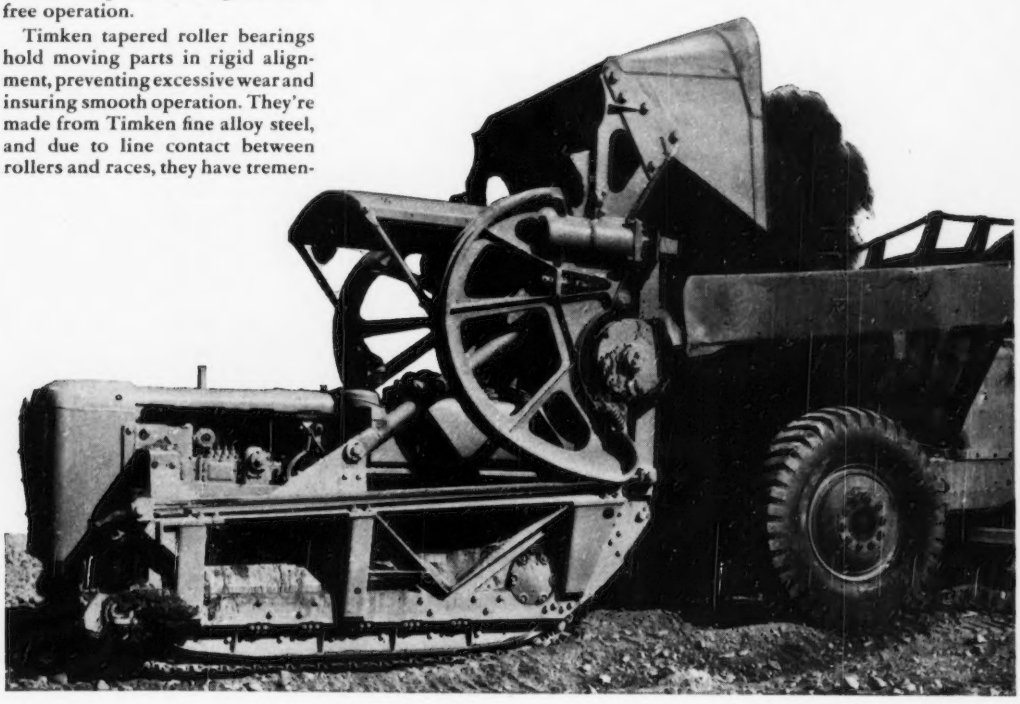

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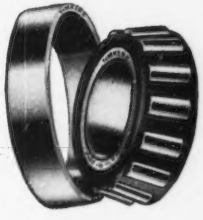

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